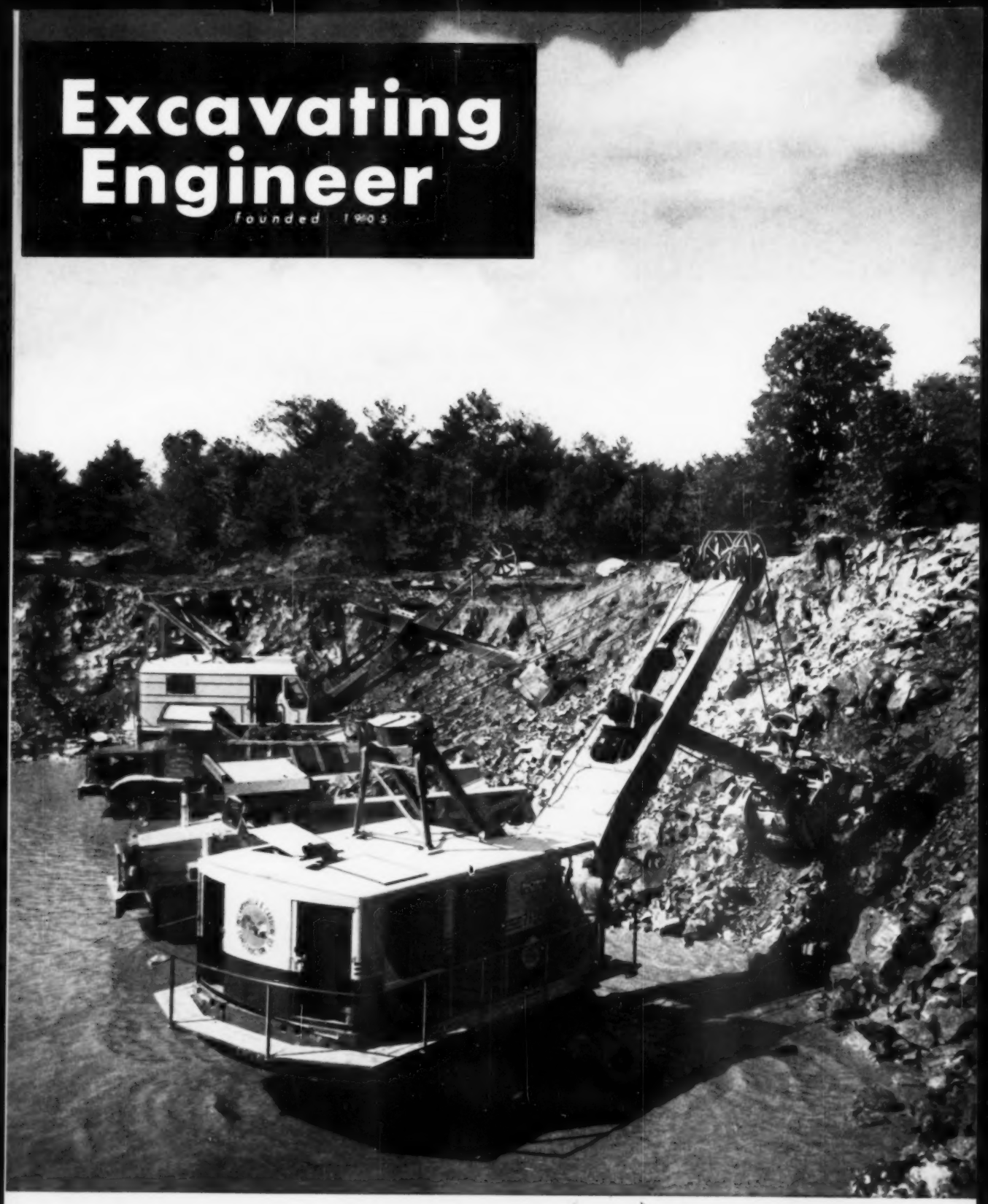
Excavating Engineer

Founded 1905



Power shovels in the 3 to 4-yd. class are becoming common on interstate highway contracts. This job is interstate route 93 near Reading, Mass. A story begins on page 22.

MARCH 1959

Q *Why do* **MORE AND MORE** *Cities Buy Hydrocranes?*

A ONE BIG REASON: IT'S ALWAYS A 2-IN-1 MACHINE!

On your busy schedules you have dozens of hit-and-run assignments that require both a *lifting* machine, then *digging* machine. With one Hydrocrane you have both . . . *on the spot!* The Hydrocrane is a crane — lifts 12 tons. Five minutes later, it can be a clamshell. You simply swing around and pick up the bucket from the handy carrying rack, reeve the wire rope, and you're ready to dig in! Hydrocrane versatility saves you *both* time and money . . . lets you handle a bigger schedule with fewer machines.

Your Bucyrus-Erie distributor will give you all the facts. Ask him to prove them with a demonstration. Call him today or write Dept. 2H59B for free bulletin. Bucyrus-Erie Company, South Milwaukee, Wisconsin.

Feature for Feature— it fits your needs!

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- **Power-set outriggers make the rig rock-steady over any kind of ground.**
- **"Gentle as your hand" metered oil controls are smooth, easy to run, boost both production and your safety record!**
- **Hydrocrane's telescoping boom lets you work in close quarters, or stretch out long for a big 70-ft. reach!**

The Hydrocrane's built-in carrying rack is designed to make attaching the clamshell quick and easy . . . a one-man job!

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Over 50% of all Hydrocranes sold last year were REPEAT SALES!

Ready-Mix plant owner says

"I Looked at Other Loaders . . . but I Liked Tractomotive best"

When it comes to buying equipment, careful consideration is given to its purchase by E. C. Voit & Sons, Inc., owner of a Ready-Mix concrete plant in Madison, Wis.

"I looked at other loaders," said Mr. Voit, "but I liked this 2-yd TL-20 TRACTOLOADER* best." He added that he also likes the Tractomotive dealer — "our relations have been mighty happy over the years."

A good product backed by a good dealer — that's the combination Tractomotive offers you—no matter where you are located. Allis-Chalmers construction machinery dealers throughout the world handle Tractomotive loaders and other Tractomotive products exclusively.

Like Mr. Voit, why not see what a modern TRACTOLOADER will do before *you* decide. On the TL-20 and TL-16, the exclusive *one-lever* control of speed and direction alone will add many extra yards to your daily production. See your nearby Allis-Chalmers dealer soon . . . he has a full line of TRACTOLOADERS to show you — two- and four-wheel drive.

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Here — in a compact book — is the information you can use to reduce your yearly rope costs. It's free to wire rope users . . . just ask for G16: Macwhyte's "Blue Book of Wire Rope."

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Wire Rope made for a purpose—to serve you better

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Excaving Engineer

founded 1905

South Milwaukee, Wisconsin

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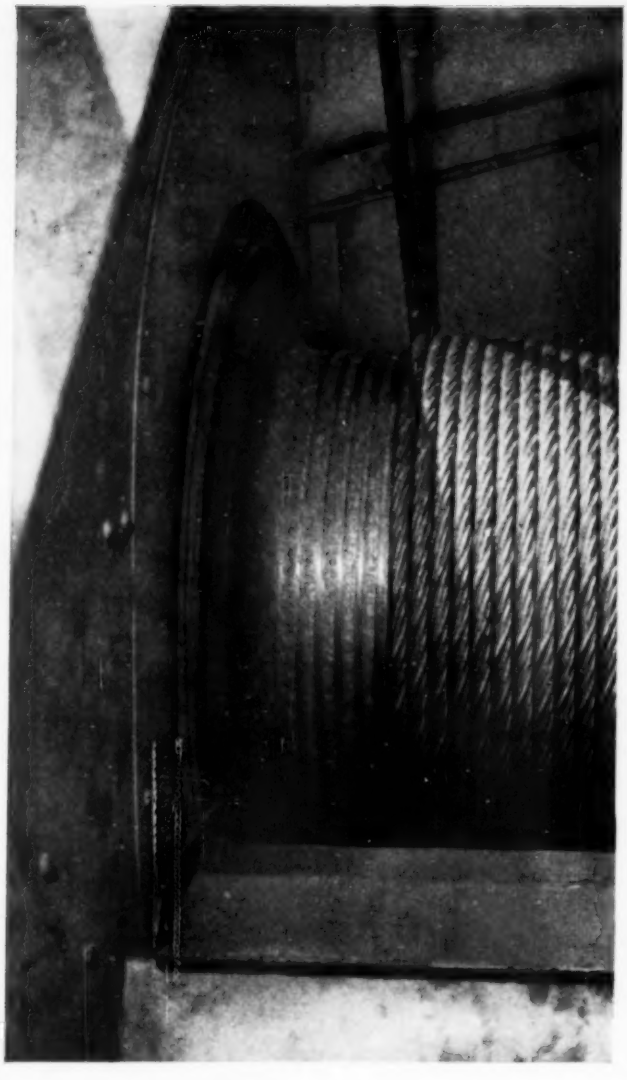
Herringbone's two pairs of Lang lay strands and one pair of regular lay strands provide the ideal combination of maximum flexibility with good stability.

Finer wires inside contribute to Herringbone's excellent drum-winding characteristic.

Heavier outside wires in each strand have greater resistance to abrasion.



"... we would never hesitate to recommend it"

GRAY & FEAR, CONTRACTORS

This company continues: "We have been using your Roebling Herringbone* for about one year. We find it is one of the best ropes we have ever used, outlasting previous ropes three to one. It is good that such a reliable rope is available."

This is a direct field quote on the most remarkable development in wire rope in years . . . a new concept in wire rope design. Roebling Herringbone is the regular lay and Lang lay wire rope—two-ropes-in-one rope—combining the best features of both.

Herringbone delivers extra flexibility, extra abrasion resistance, unusual structural stability, extra resistance to shock, easy operation over sheaves and drums and smooth spooling properties.

We recommend Herringbone without reservation for general hoisting and the entire range of heavy-duty equipment. Your Roebling Distributor or Wire Rope Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey, will give the full and fabulous details. *Reg. App. For

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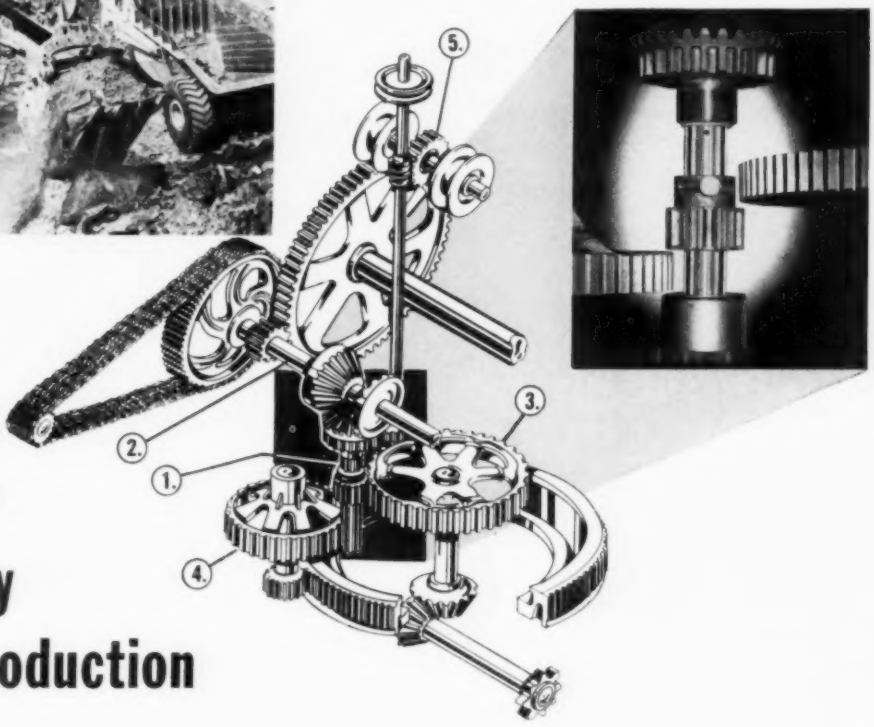
Subsidiary of The Colorado Fuel and Iron Corporation

ROEBLING
HERRINGBONE
WIRE ROPE

This Manitowoc Model 3000 shovel equipped with a 2½-yd. dipper loads out 2000 yards of hard sandstone per day on a Midwest road job. One of the most important factors contributing to the unit's output record is the Manitowoc "Power-flo" drive described below.



The key to Manitowoc's extra power is the key to top production

. . . and that extra power is provided through the *exclusive* Manitowoc "Power-flo" slide pinion arrangement that directs the full flow of engine power *only* to the function in operation. There are no power-robbing extra gears moving, even when not in operation (and gears that don't move don't wear out) . . . no complicated trains of gears that hold production down and keep maintenance costs up.

What arrangement could be simpler? As shown in the photograph above, the slide pinion itself is a single, sturdy shaft, spline-fitted with the necessary gears to engage, or disengage the desired function. The slide pinion (No. 1 on the drawing) is driven directly from the drive shaft (2) using only one set of clutches to drive the travel, swing and boom hoist.

With the slide pinion up, the power flows directly from the reversing clutches to the travel gear (3) through the center pin and to the horizontal shaft in the carbody.

With the slide pinion down, the power flows directly to the swing shaft (4) containing the final drive pinion, which meshes with the carbody ring gear.

With the slide pinion in neutral, the reversing clutch is left free to operate the boom hoist (5) if an optional independent boom hoist is not used.

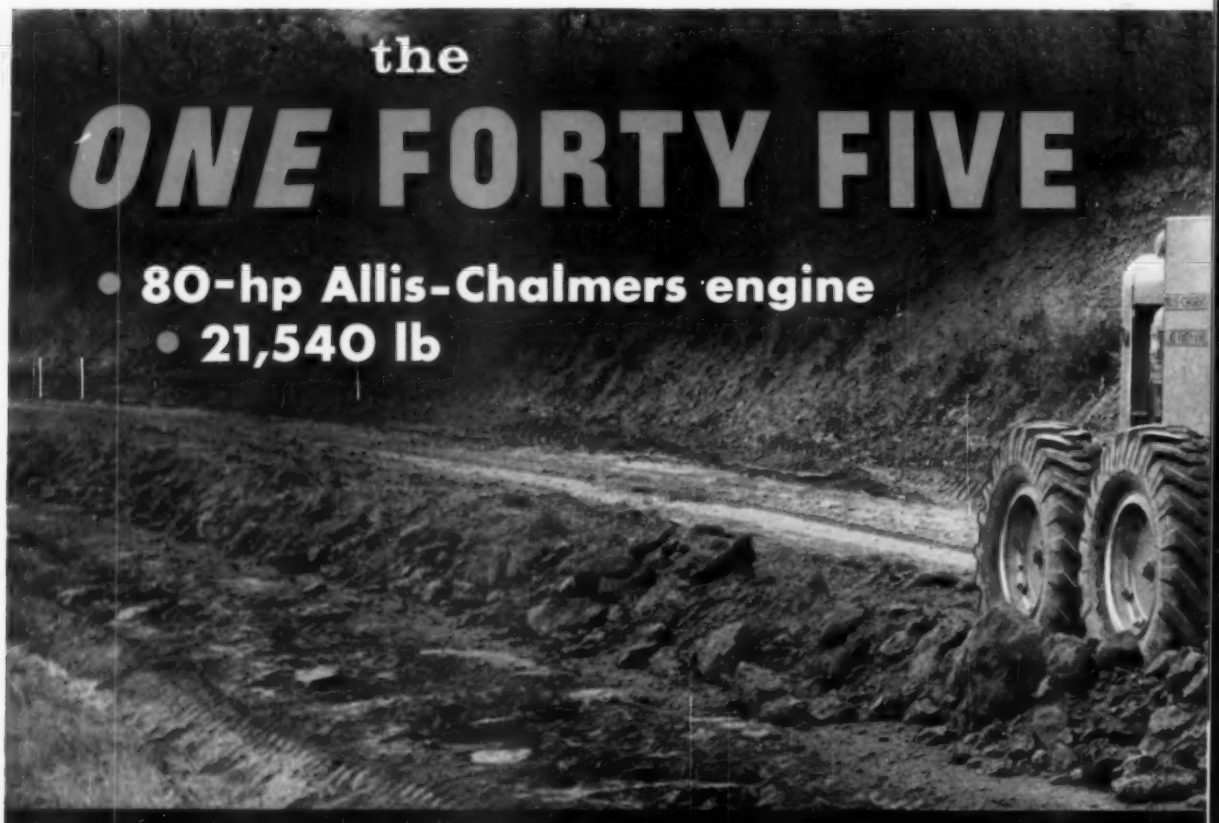
The result is *direct* power to every function . . . a feature found in *Manitowoc* cranes, draglines and shovels. The faster cycle, heavier lifts and bigger bites found in Manitowocs are the direct result of this simple and effective "Power-flo" design. That's why output is *measurably* higher with Manitowoc . . . that's why it will pay you to see your Manitowoc dealer for complete information on the rig best suited to your operation.

Manitowoc

MANITOWOC ENGINEERING CORP.
(A subsidiary of The Manitowoc Company, Inc.)
MANITOWOC, WISCONSIN

CRANES	SHOVELS	DRAGLINES	TRENCH HOES
20 TON - 100 TON	1-YD. - 5½-YD.	1-YD. - 6-YD.	1-YD. - 2½-YD.

Allis-Chalmers announces a new motor grader in the 80-hp class



. . . Another outstanding motor grader joins the Allis-Chalmers line
the ONE FORTY FIVE

MODEL D
58-hp Allis-Chalmers engine
8,800 to 11,450 lb

***ONE* FORTY FIVE**
80-hp Allis-Chalmers engine
21,540 lb

FORTY FIVE
120-hp Allis-Chalmers engine
23,800 lb

move ahead with **ALLIS-CHALMERS**...

BEST BUY IN THE MEDIUM-POWER FIELD

- Heavy-duty throughout at a money-saving price.
- Designed and built for long, hard service on any construction or maintenance assignment.
- Retains the widely-accepted characteristics and performance features of the 120-hp Allis-Chalmers FORTY FIVE grader.
- Offers the best combination of operator features of any grader near its size.

Operator advantages no other medium-priced grader can give you . . . "wide-open" visibility . . . over-the-circle lift cases . . . suspended pedals and exclusive no-kick, toggle-type controls.

Power for high production. Husky, high-torque Allis-Chalmers diesel engine handles overloads without shifting down . . . geared for good range of travel and working speeds.

Load-handling ability second to none. The new *ONE* FORTY FIVE has a 26½-inch-high arched front axle—and highest throat clearance in its class. You get more dirt to the ROLL-AWAY moldboard and move it with efficient rolling action that uses less power.

See the new *ONE* FORTY FIVE motor grader at your Allis-Chalmers dealer's. Check its dollar-saving price. Then check its 80 hp and 21,540 lb on an actual demonstration. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wis.

ROLL-AWAY is an Allis-Chalmers trademark.

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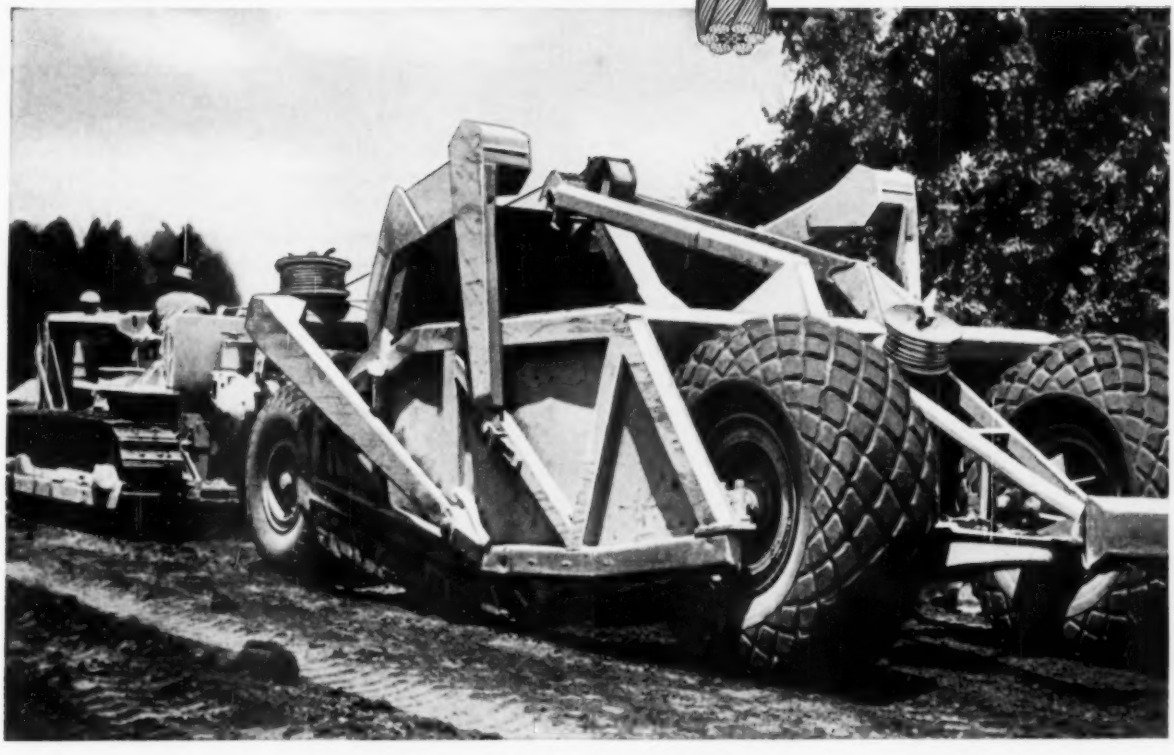

"Best Cable We Ever Used...We're for VHS 100%"

says Roadbuilders, Inc., Greenville, South Carolina

Today, more than ever before, road contractors appreciate the need for rugged cable to keep earth-moving equipment rolling on schedule. Many contractors, like Roadbuilders, Inc., have found the best possible answer to longer cable life. They use VHS—the remarkable new grade of wire rope that is tougher, more wear-resistant, and 15% stronger than the next best grade of wire rope. Contractor after contractor has discovered that VHS is still giving service long after other cable has been discarded. If the cable you are now using has failed you when you need it most, then learn how TRU-LAY VHS can help you save time and money.

What's different about Tru-Lay VHS?

TRU-LAY VHS is not just another "brand" of wire rope—it's a new *grade* of wire rope which is tops for quality and performance. Before TRU-LAY VHS (Very High Strength), the best grade you could buy was TRU-LAY Preformed Improved Plow Steel—and it still is the most practical grade of wire rope for some uses. However, where extra strength and toughness are needed—such as for draglines, shovel hoist ropes, scraper and dozer cable—you'll find TRU-LAY VHS outlasts and outperforms any other cable ever made.

Only one source for VHS

Thanks to expanded production and large warehouse stocks, you can now get immediate shipment of TRU-LAY VHS from American Cable distributors anywhere in the country. But remember . . . there's only one superior grade of wire rope—VHS; and only one company makes it—American Chain & Cable. So tell your distributor you want VHS next time you are ordering wire rope.

ACCO

American Cable Division

AMERICAN CHAIN & CABLE

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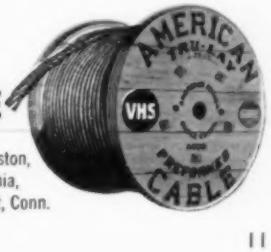

Here's why 22-B Transit Cranes

At 20 to 40-ft. radii, where you do the most work with a truck crane, the 22-B handles *bigger* payloads! Look at this comparison:

AT 20 FEET, 22-B LIFTS 33,000 LB.

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- **1** Competitive machine lifts 23,500 lb.

AT 40 FEET, 22-B LIFTS 13,000 LB.

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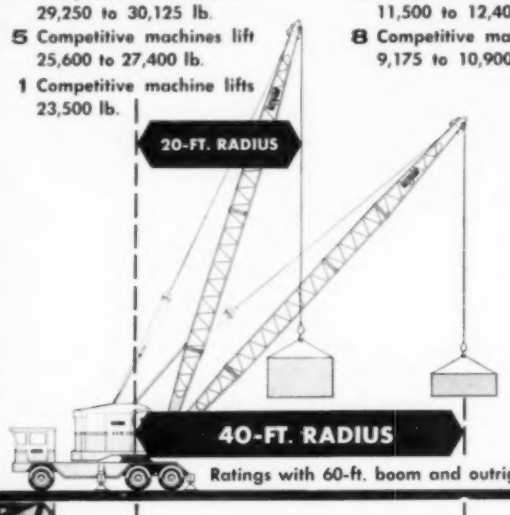


Ratings with 60-ft. boom and outriggers set.

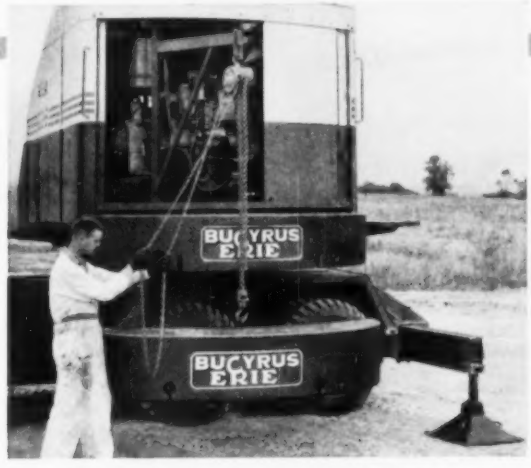
This is where MOST WORK IS DONE!

☆ **There's unusual stability** in the 22-B's wider spread outriggers. On the job, owners pull beams out to full 15-ft. spread, block them up — they're ready to work.

See your BUCYRUS ERIE® Distributor.

are YOUR BEST BUY!

Compare the capacities, compare the features!



WITH THE 22-B YOU GET

Unmatched load control!

- Power-Controlled Lowering Boom Hoist
- Power-Controlled Load Lowering (hoist line)
- Friction Swing Brake
- Conical Hook Rollers

☆ Strips fast for travel!

Counterweight drops fast! Lowering time is cut to minutes by this special jib crane. System is manually operated, lets you drop counterweight to ground or low-boy trailer.

☆ Folding booms cut move time!

You save dismantling and set-up time on moves with this hinged-section boom. Note lowered mast for minimum height during travel.

☆ Boom and mast lower to cab height!

Booms up to 75 feet with or without mast can be lowered to cab height for traveling, *without* dismantling. 22-B picks up to 130 feet of boom and jib from ground without outside assistance!

☆ High alloy steel booms

are 50% stronger than ordinary structural steel booms, yet lighter in weight. Owners lift more PAYload . . . less DEADload!

He will show you a 22-B in action!

BUCYRUS ERIE®

BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

Excavating Engineer
founded 1905 MARCH 1959

An International TD-24 levels fill placed in the 26-ft. wide roadway winding up an Alaskan mountain peak to the new Nike site.

Alaska Contractors Build Difficult Nike Sites

by E. L. Atkinson

ALASKA, often called a proving ground for heavy equipment, has in its vast terrain troublesome quirks which test the mettle of tough construction men.

Since 1941, over $2 billion has been spent there to build military bases and runways, air navigation aids and stations of famed DEW line. Construction of these projects is under supervision of the Alaska District of the U. S. Army Corps of Engineers—which is gearing up the newly-admitted state for its own defense and for protection of the rest of the nation.

Completed several months ago were several Nike sites, bringing to the continent's northern rim guided missiles to guard strategic military areas.

One of the most difficult Nike installations was Site Summit which will protect Elmendorf Air Force Base, Fort Richardson and the city of Anchorage, in southcentral Alaska.

Site Summit had to be blasted and broken from the sharp peak of a 4,000-ft. high mountain. Its geological structure was decomposed granite and insitu rock. The pinnacle—an inverted cone—was made up of hard rock with numerous cracks and faults.

The weather vagaries, partial inaccessibility and a short work-season—construction is "socked in" by September—called for extra efforts by contractors.

Starting from scratch at the primeval location, crews cleared the site; built roads; excavated for foundations, underground tanks and utilidors; and erected more than a dozen structures.

To go up were two launching structures of monolithic concrete, each 10,600 square feet; a 26,600 square-foot battery control building; and a 7,000 square-foot launcher control building.

Also to be put in were an electrical distribution system and heating and water systems.

Joint Venture

The Nike installation was a joint-venture of Patti-MacDonald Co. and the M-B Contracting Co., Anchorage. Another Anchorage firm—Connolly Construction Co.—held a separate contract for building a 7,200-volt primary overhead line from a power source seven miles away.

Assault on the wild mountain was divided into several phases. While crews were on progressive stages of mountain roadbuilding, a rough trail was made to the peak for the drillers and powdermen.

Crews at Site Summit started in May 1957 as soon as equipment could navigate the snow-drifted alpine slopes. Caterpillar D8 dozers removed the spotty, 40-ft. snow drifts, while throwing aside slabs of frozen ground.

Road crews completed an eight-mile switch-back road connecting a plateau, used for the launching structures, with the peak used as the site of the radar units. A 10% maximum grade was allowed for the 1,100-ft. vertical distance and 8,000-ft. separation between the areas.

A total of 95,000 yards of material

Weather, bad terrain and a short work season complicate $9½ million defense project.

was taken out of the Chugach mountain peak, including 35,000 yards of blasted rock, in building the 26-ft. wide road. International TD-24 dozers, 18-yd. Euclid scrapers and a Terrapac compactor were utilized in the combined processes of soil-stripping, borrowing, grading and compacting.

"There was very little obstructive material below the tundra-like surface," said Bill Barker, project superintendent for P-M. "Routine road building procedures were followed right along."

There were, however, some special angles. Materials for the road had to meet specifications for non-frost susceptibility. They were developed at the site from native rock and aggregate, worked by a rock crusher built on the mountain by the contractors.

The road, in use during the 1957 season, was surfaced in final weeks of the 1958 season when dump trucks were added to the mechanical fleet.

Meanwhile, a minimum crew had climbed to the peak to blast off its top. Then with more space to work, the men chipped away 25,000 yards of rock—leaving the peak 60 feet short of its original height.

Drilling was handled by Ingersoll-Rand jack hammers and wagon drills with 1⅛ and 2½-in. drill steels and detachable bits. Air power was supplied by an Ingersoll-Rand 600-cfm compressor and a 500-cfm Gardner Denver.

Depth of blast holes ranged from a minimum of 16 inches to a maximum of 24 feet. Part lifters and part vertical, the type of holes depended on terrain encountered, with depth varying according to each particular projection.

On the average, holes were spaced on 5-ft. centers. They were loaded with 1½-in. cartridges of Atlas 40% dynamite. Sand was used for tamping some blast holes.

Because the earthmoving was extremely variable—through disintegrating rock, pockets of gravel and tundra-like soil—an individual shift average was not estimated.

Usable material blasted from the peak went into road fill and area fill. The waste rubble was dozed by Cat D8's over the mountain side. Most pieces lodged on a shelf below the peak; odds and ends tumbled down into timberline.

Frozen Seams

Easy disposal of the excavation was offset by the trouble given by freezing of the seamy rock. Frequently while being drilled, ice seams in the hard rock melted from the heat of the drill, then froze again as it was removed. This situation was solved by an intermittent attack. After two or three feet of drilling, the hole was shot. Then several more feet were negotiated and shot, until the problem area was finished.

Extreme wind and weather conditions at the site required special features. There was always a breeze on the lofty peak, belting up gusts clocked up to 150 mph before a wind gauge was blown away. Concrete structures are reinforced with 1½-in. steel rods encased in 36-cu. ft. concrete slabs buried in the ground. With turnbuckles to hold against the wind, the reinforcing goes all the way around some of the buildings.

Concrete was batched on the job with four Jaeger transit-mixers used to deliver to the structural forms. Although adequate raw materials were at hand, it was cheaper to haul aggregate up the mountain from Anchorage, than to develop at the site.

Another factor on this job was the close tolerance on the concrete work. This specification was ⅛ of an inch in 10 feet, and it required highly skilled men.

An Alaskan innovation at Site Summit are utilidors which protect power, heat, water and communication lines

Site Summit is perched 4,000 feet above sea level in the Chugach Mountains, part of the St. Elias Range. Here the access road loops around a helicopter pad.

Pushing assistance is given 18-yd. scrapers by the TD-24 as they load in a cut.

An Ingersoll-Rand wagon drill bores snake holes into decomposed granite rock as the contractor carves out a flat site for radar structures in the jagged mountain terrain.

from extremely cold temperatures which prevail during winter months. These utility tunnels connect all structures in the launching area.

Special attention was given the sewage disposal problem, because of possible contamination to drinking water of Anchorage, whose source is the nearby Ship Creek watershed. Septic tanks were built for each area, insulated as a cold-climate precaution. Provision was made for heating for decomposing action.

Variances in elevation produced abrupt climatic changes for the men almost daily. Driving to the day's work through a sunny summer day, they would be engulfed in fog layers so thick "you could put out your hand and move it," one said. This restricted visibility slowed work. For example, two men on either end of a 24-ft. steel rod would have trouble seeing each other during the "fog-out."

The fog, wind, cold and dampness handicapped efficiency of men bundled up in heavy, clumsy clothing.

At times, 125 men drove up and back the hazardous approach to the site. There was very little turnover in personnel and morale of men was high. Overtime was possible, and double shifts were used on drilling and rock work.

In spite of Nature's fury, an excellent safety record was maintained. A new ambulance, parked in the summit area, registered the initial eight miles to the site. "And that is all the mileage we want on it," said one spokesman.

One of the safety regulations, mandatory in Alaska construction, and written into all contracts awarded by the Alaska District is the wearing of "super-tough" hats. Cleats were put on all access ramps at the different structures, and guard rails and toe boards were added on all scaffolding, as precautions.

There seem to be certain compensations on Alaska jobs. At Site Summit even the men accustomed to magnifi-

Continued on page 21

Workmen spread concrete into forms for utilidor structure. Concrete is batched on the job and delivered by Jaeger mixers. Utilidors are an Alaskan innovation designed to protect power, heat, water and communication lines from subzero temperatures.

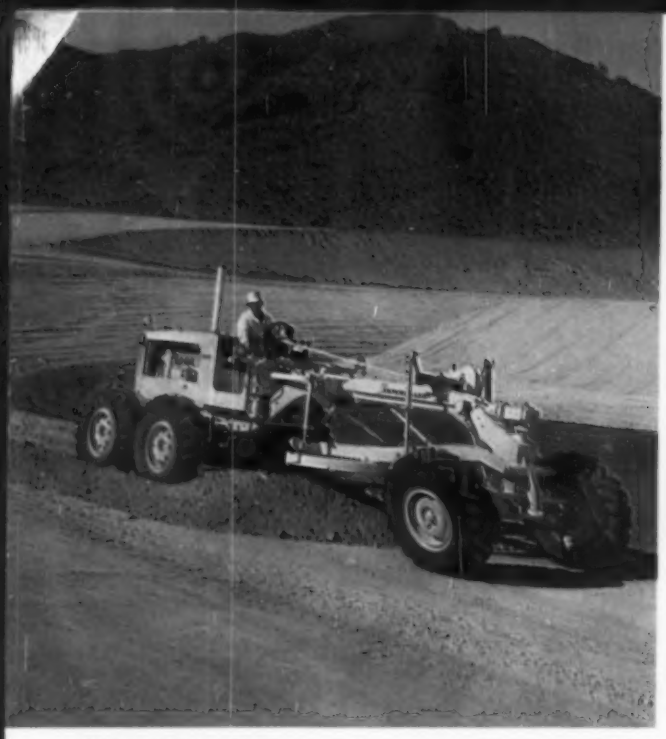
CATERPILLAR'S PROJECT PAYDIRT

***PROJECT PAYDIRT** pays off for you again*

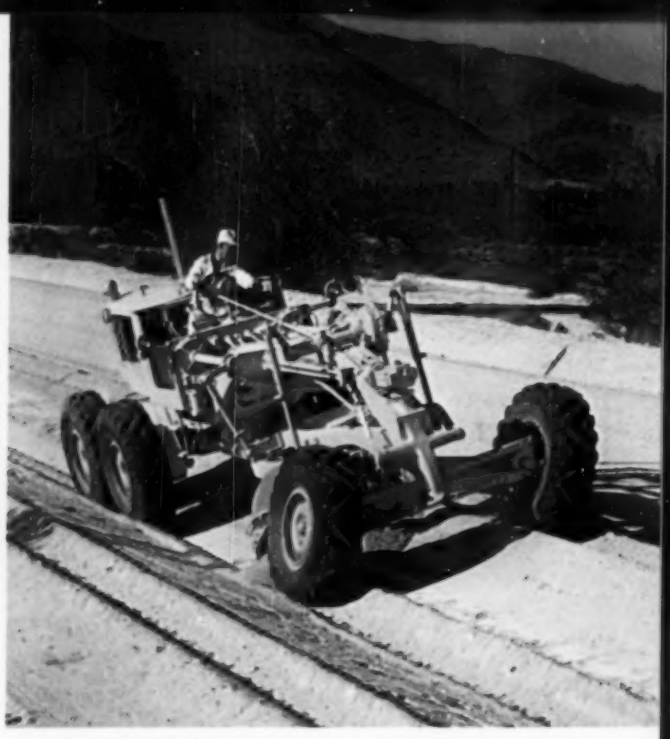
BIG NEW CAT No. 14 TURBOCHARGED MOTOR GRADER

Most versatile big grader ever developed, recommended for everything from the roughest jobs to the finest grading!

PROJECT PAYDIRT: Caterpillar's multi-million-dollar research program—to meet the continuing challenge of the greatest construction era in history with the highest production earthmoving machines ever developed.



MAINTAINING HAUL ROADS, the No. 14 pays off with high capacity and high availability on the toughest construction jobs. It has the power to handle heavy material at speeds that won't interfere with hauling units!



DITCHING AND SPREADING, the No. 14 pays off with high production in this most demanding work. When working in fill areas, you can also use it to advantage spreading subbase and fill!

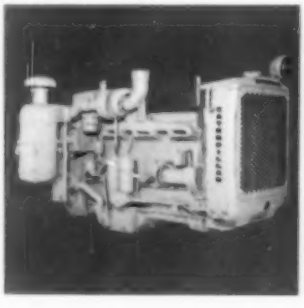
BIG, VERSATILE No. 14 PAYS OFF WITH

In the new No. 14 Series B, Caterpillar brings you the most versatile motor grader ever developed in the "big machine" field. It is the one big grader that delivers high capacity both on the roughest and finest grading work. Another major achievement in Caterpillar's "Project Paydirt," it answers the contractor's need for a unit that comes through dependably with higher, faster, lower-cost production on today's big jobs.

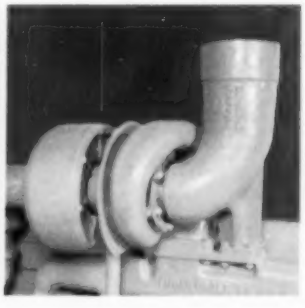
The first and only Turbocharged Motor Grader, the No. 14 packs 150 HP (rated at sea level). Weighs in the 30,000 lb. class. Operates at the highest practical working speeds with either a 12-ft. or 14-ft. moldboard. Has a turning radius of 36 ft. And with all this power and heft, it has the extra strength to deliver the high availability for which Cat Motor Graders are famous.

In the new No. 14 you'll find the latest engineering advances developed by Caterpillar research. Example: new design permits increased clearance between moldboard and circle for greater loads. You'll also find exclusive time-tested Caterpillar developments. Example: the oil clutch. All of these many features, some of which are listed here, pay off in this one fact:

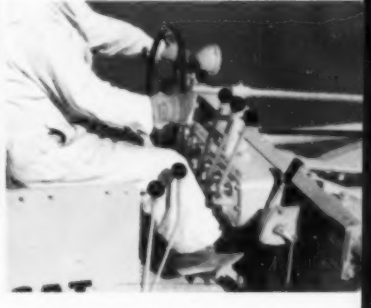
NEW DRY TYPE AIR CLEANER. Most efficient air cleaner ever developed. Removes 99.8% of all dirt from intake air during every service hour. Can be serviced in five minutes. Cuts maintenance time (by as much as 70%) and costs. Extends engine life.



TURBOCHARGED CAT ENGINE. First and only Turbocharged engine ever offered in a motor grader. Of job-proven design, it is ruggedly built for a long life under severe working conditions. Like all Caterpillar Engines, its high torque rise (18%) pays off on the job.



NEW TURBOCHARGER. Close-up of the Cat Turbocharger, which greatly increases over-all engine performance. Turbocharger utilizes waste energy from engine exhaust to step up efficiency and economy. Fuel system permits use of economy-type fuels without fouling.



IMPROVED MECHANICAL BLADE CONTROLS. Standard on the No. 14. Improved design increases speed of response 25%. Controls provide precise blade adjustment, reduce kickback, ease engagement. "Anti-creep" lock makes blade stay put under load.

BANK SLOPING, the No. 14's low center of gravity and broad 8-ft. base pay off in superior blading and machine stability. An operator can work with confidence on steep slopes—and maintain high production on them!

FINISHING, the No. 14 pays off with maximum efficiency on fine or rough work. With the new transistorized Preco Automatic Blade Control, it controls blade slope within ⅛ in. in 10 ft.—cuts fine grading time as much as 50%.

HIGH CAPACITY ON EVERY GRADING JOB

You can use the No. 14 profitably on many different applications such as:

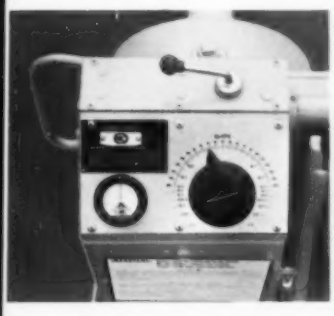
—power applications like heavy grading, heavy ditching, rough grading and bank sloping.

—control applications like light spreading, surface maintenance, fine grading and light blading.

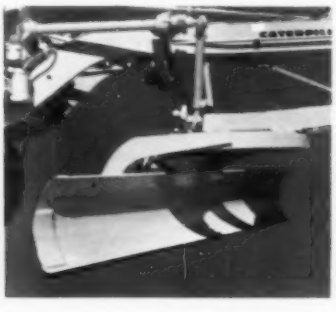
As a result, you don't have to pick "spots" to make the No. 14 pay off for you. This all-purpose grader will earn its keep on every application with high capacity and low operating cost. But see for yourself. Get the complete facts on the big new No. 14 from your Caterpillar Dealer. Go over it on his lot—watch it work on your job. Say when and where—he'll demonstrate!

NEW TURBOCHARGED No. 14

Engine HP	(rated at sea level)	150
Weight		29,280 lb.
Blade	Standard	12 ft.
	Optional	14 ft.
Tires (w/10-in. rims)		
	All around	14.00-24 (10 ply rating)
Travel speeds: 6 forward, 2 reverse		2.6 to 21.6 MPH



PRECO AUTOMATIC BLADE CONTROL. Optional on the No. 14. Another exclusive! Operator selects desired slope on dial. Now transistorized for freedom from maintenance and adjustment, the unit automatically maintains blade slope within ⅛ in. in 10 ft.



AMPLE THROAT CLEARANCE. New design permits increased clearance between moldboard and circle for greater loads. Extra strength is built into frame, drawbar and circle to match engine power, absorb punishment of rough work and assure accurate blading in tough going.

14.00-24 TUBELESS TIRES. All way around—all tires mounted on 10-in.-wide rims to stiffen tire side-walls and reduce tire "roll." Large tires on front end improve machine stability.

POWER STEERING AND POWER BRAKES. Both provide the fast, positive response that gives an operator complete confidence to tackle tough jobs. Ease of operation helps him maintain high production anywhere.

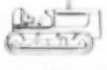
UNEQUALLED VISIBILITY. Dash-mounted lift gears and low frame design provide clear visibility. An operator, while seated, has an unobstructed view of critical areas at the front wheels, toe of the blade and circle. Convenient in-seat starting is another No. 14 plus.

EXCLUSIVE OIL CLUTCH. Most advanced clutch design in the industry. Provides up to 2,000 hours' service without adjustment, the equivalent of about 12 months of "adjustment free" operation. Virtually eliminates down time for clutch repair.

How Project Paydirt pays off across the board for you in the only complete earthmoving line!

In the No. 14, you have just seen one of many achievements of Caterpillar's multi-million-dollar research program. This program is responsible not only for developing new machines like the No. 14, but also for improvements in every current model—Tractors, Scrapers, Traxcavators, Motor Graders and other earthmovers.

That's why, when you invest in a Caterpillar machine, you can count on it for unmatched performance in its class. It's a modern, heavy-duty unit that pays off where the chips are down—on the job. Here's the line-up at your Caterpillar Dealer to help you to more profitable earthmoving. Besides the No. 14, it includes the No. 12 and No. 112 Motor Graders and the following:



FIVE TRACK-TYPE TRACTORS: Spearheaded by the "take-charge" D9 (320 HP), there's the new D8 (225 HP), D7 (128 HP), D6 (93 HP) and D4 (63 HP). (All are flywheel ratings.) Plus a complete selection of 'dozers (including the No. 7G Bulldozer), rippers, tool bars and tool bar equipment.

THREE TRAXCAVATORS: These front-end loaders provide a range of capacities that meet every purpose—No. 977 (2¼ cu. yd. bucket); No. 955 (1½ cu. yd.) and No. 933 (1 cu. yd.). All can be equipped with the exclusive Side Dump Bucket, or other quick-change attachments—special buckets, teeth, bulldozers or forks.

THREE WHEEL-TYPE TRACTORS: The two-wheeled DW21 (345 HP, max.), the four-wheeled DW20 (345 HP, max.) and DW15 (200 HP, max.) team with matching LOWBOWL Scrapers for high production: the No. 470 (19.5 cu. yd. struck), No. 482 (24 cu. yd. struck), No. 456 (19.5 cu. yd. struck) and No. 428 (13 cu. yd. struck) respectively. Four Cat 4-wheel Scrapers are also available: Nos. 491 (27 cu. yd.), 463 (18 cu. yd.), 435 (13 cu. yd.), and 60 (7 cu. yd.), all struck capacity. And Athey Wagons couple with Cat wheel-type Tractors for rear or bottom dumping.

Your Caterpillar Dealer is headquarters for the most productive earthmoving equipment line in the field. He's a source of reliable information and service. See him today!

Caterpillar Tractor Co., Peoria, Illinois; San Francisco, California, U.S.A.

CATERPILLAR

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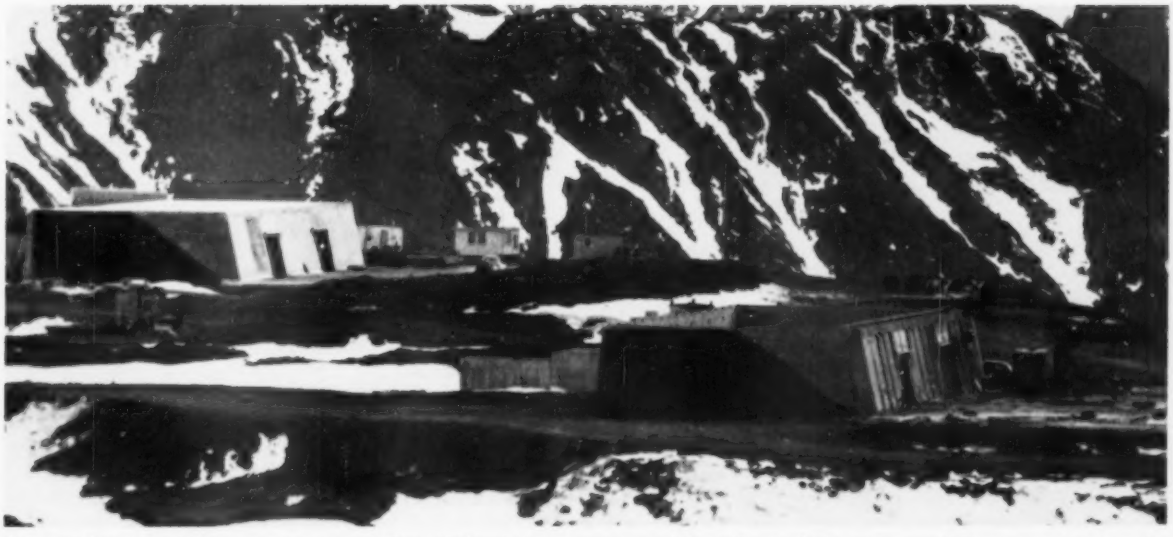
Diesel Engines • Tractors • Motor Graders • Earthmoving Equipment

BORN OF RESEARCH
PROVED IN THE FIELD



(Above) Launcher bases are near completion. (Below) Crew papers and tars the roofs to waterproof them against elements.

Nike . . .

Continued from page 16

cent scenery were impressed at the tremendous mountain and marine panorama visible from the peak.

Behind the summit lies bowl after bowl of bold, timbered slopes, with icy-blue streaks of perpetual glaciation. In the silvery foreground of Cook Inlet loom the city of Anchorage and the shoreline to distant Point Worzanoff.

Close up the builders could watch mountain goats, moose, wolves, black bear and a colony of squirrels who kibitzed the Nike installation.

To date, cost of Nike construction projects in Alaska total more than $21 million. Site Summit and adjoining sites represent a $9,495,744 share—the work performed by a joint-venture of Patti-MacDonald and the M-B firm. Other P-M jobs in Alaska include the 14-story Hodge building and dock at the U. S. Army's port of Whittier and a DEW Line installation in the Aleutian Islands.

Gordon Lyon was project supervisor for the Corps of Engineers at Site Summit. With the M-B Contracting Co. was James Gordon, project manager, and Joseph Sipes, project engineer.

Patti-MacDonald Alaskan operations are headed by Gaylord Lefler, project manager and Harold Gall, general superintendent. William Barker was Site Summit project superintendent for P-M.

Dead-Eye Accuracy

Nike is said to be the most formidable of the Army's antiaircraft weapons, because of its maneuverability and speed.

All the Alaska Nike sites are designed to fire ground-to-air missiles resulting from electronic and rocket research of the U. S. Army.

These "dead-eye" projectiles are set up by radar brains and triggered by wizard-like electronic devices. The rocket and its booster stand on a firing platform aimed at the sky. When radar detects an "enemy" plane, the object is tracked by a second radar. Nike automatically fires when the two units close in.

Nike installations are not dangerous to the surrounding area nor to personnel. The warhead explodes only in flight and has a self-destructive feature so it will not crash and explode. The deadly darts have been named for Nike, Greek goddess of Victory.

Site Summit and the additional Nike sites were completed by the contractor by the target date of October 31, 1958. They were immediately turned over to army units for operation and are now manned by specially trained military personnel.

Gordon Lyon is project supervisor at Summit Site for the Corps of Engineers.

Big Truck Fleet Moves Rock, Peat Bogs on Interstate Highway

Rhode Island contractor builds 5.3 miles of Massachusetts interstate 93 at cost of $7.6 million. Excavation, borrow and crushed stone items in contract require busy hauling schedules.

BUILDING a highway through the ledge-rock covered landscape around Reading, Mass., has given Campanella & Cardi Construction Co. the chance to demonstrate how efficiently a tough truck-hauling operation can be run.

The road job is part of interstate route 93, which is a new super-road replacing the present state route 28 between metropolitan Boston and the New Hampshire state line.

Campanella & Cardi, whose home base is Hillsgrove, R. I., is building a twin-strip roadway 5.3 miles long with 50-ft. wide pavements separated by a depressed median and bordered by broad shoulders. Total construction cost, exclusive of right-of-way, is $7.6 million.

The work actually consists of two separate but adjoining contracts. The first contract is 2.5 miles long and is designated section B. It was awarded in fall of 1957 by the Massachusetts Department of Public Works on a low bid of $3,392,324. The second contract known as section C was awarded in spring of 1958 on a bid of $4,219,044. Both contracts must be ready in March 1960.

Long Relocation

In addition to Campanella & Cardi's contracts, there are six other sections involved in the relocation of route 28. All eight contracts total 18.6 miles and will have a combined cost of $19.2 million. The project is being financed under the federal interstate "90-10" provisions.

Even though total length of sections B and C is only slightly more than five miles, contract items require prodigious efforts from the road building crews. This is due both to the terrain and the nature of interstate work. The broad right-of-ways and exceptionally high standards of design send earthmoving quantities and related items skyrocketing.

Major quantities on combined sections B and C run as follows: peat, 569,000 cubic yards; dirt, 793,500 yards; rock, 433,000 yards; and ordinary borrow, 2,082,000 yards.

Campanella & Cardi is well geared up to meet the task of cutting down ledge rock and mucking out peat bogs.

Big-capacity shovels and clamshells were working on the contract excavation items during last year's construction season. A Bucyrus-Erie 3-yd. 71-B shovel and a 3½-yd. P & H 1055 model bailed material out of heavy rock cuts. Both machines were diesel-powered and were new machines on their first job.

Five 2½-yd. Northwest 80-D's handled stripping chores and digging of earth and gravel borrow. There was also a Northwest model 6 hoe whose 1½-

Blue granite is dug from a cut on Massachusetts interstate 93 by a 3-yd. shovel which loads 22½-ton Mack LVX end-dumps.

A 3½-yd. shovel loads fine material from the same cut into 18-yd. Heiliner bottom-dumps specially converted for rock hauling.

yd. dipper dug sewer trenches. A bucket-equipped Gradall also assisted with trenching.

Miscellaneous lifting assignments and pouring of concrete were handled by a Lorain 20-ton truck crane and a P & H 455A truck crane.

Because peat was a major problem, the firm had three large cranes assigned to casting the unstable material off the right-of-way or loading it into trucks for off-site disposal. The largest of these was a Bucyrus-Erie 54-B with 85-ft. boom and 3½-yd. Owen clam bucket. Two Link-Belts—a K-595 and a K-370—were equipped with a 3½-yd. Owen and a 2-yd. Williams clam respectively.

There were a half dozen major peat bogs plus numerous smaller pockets. Depth ranged from 8 to 36 feet, averaging about 22 feet. Good granular material was backfilled into the dug-out areas.

The Reading (Mass.) job is being run by Superintendent John Ryan, assisted by Art Hallam. Worley Powell is rock superintendent and Tom Asack is bridge superintendent.

Firm Is Partnership

Santi Campanella and Americo Cardi, owners of the firm, visit the jobs periodically. Their partnership, incidentally, is now in its 18th year. General superintendent of all construction by the company is Edgar (Red) Fedeli.

Al Cardi, a nephew of the latter partner, is superintendent of equipment for the firm, and makes regular inspections of all jobs to see that maintenance procedures are carried out.

Campanella & Cardi owns one of the biggest fleets of Mack trucks on the East Coast. Practically all trucks on its interstate contract were Macks. Off-highway models included eight 22½-ton

(Above) A full 100% of the rock excavation is being used in fills like this where a Mack truck is dumping. (Below) A 13-yd. Mack B-81 10-wheeler dumps sand cushion on the rock to protect the rubber tires of hauling units crossing over the fill.

(Above) A 2½-yd. Northwest 80-D strips dirt cover from area where right-of-way is being cleared. Ledge rock underneath will later be loaded out by the larger shovels.

LVX Mack end-dumps and five 15-ton LRX's. In the over-the-road class were 27 Mack B-81 10-wheelers with a heaped capacity of 13 yards.

In addition to this spread for highway work, the company operates many trucks in other branches of its diversified operations. Down in the Providence area some 35 ready-mix trucks are used by the concrete supply division of the firm. There are Smith mixers mounted on Autocar DC100 chassis and Rex mixers on Mack B-81's.

The heavy Mack dumps were used on the interstate job almost exclusively for rock work, while the 10-wheelers hauled dirt and granular borrow and stone.

Reinforce Wagons

Also assisting with rock hauling were eight 18-yd. capacity Heiliner bottom-dumps. These units, which are designed for dirt moving, were specially reinforced to handle rock. Strips of angle iron about two inches wide were welded over the belly-dump door hinges to protect them against falling pieces. The Heiliners had served successfully hauling rock for about a year, according to Al Cardi.

For stripping purposes, five Euclid 18-yd. bottom-dumps were teamed up with Northwest 80-D shovels to load out the dirt heavily laden with boulders.

Dozing and grading equipment included six Cat D8's, two Cat No. 12 motor graders and a rubber-tired LeTourneau-Westinghouse Tournadozer. The Tournadozer's main assignment was to clean up loading faces in the rock cuts. Because the job was frequented by heavy rains, four Gorman-Rupp centrifugal pumps, with 8-in.

Cat No. 12 grader keeps road in shape for hauling. Vehicles travel the smooth sand-covered route at high speed to save time.

(Left) A 54-B with 3-yd. Owen bucket clams muck out of deep bog. (Right) Rock is backfilled into a mucked-out hole by dozer.

intake and 4-in. discharge, were available for dewatering flooded cuts.

When *Excavating Engineer* took photos of the interstate 93 progress, Equipment Supt. Al Cardi was up on an inspection trip from the shops and company garage at Hillsgrove. Driving around the job in a Ford ranch wagon, one of several owned by the company, Cardi pointed out some features of the equipment lineup and the program for servicing these machines.

"Maintenance," Cardi said, "means the difference between profit and loss on these closely bid interstate road jobs. Our problem is to prevent breakdowns and save expensive equipment.

"Take the matter of truck tires. On this job we have a lot of ledge rock and fills over which we have to do our heavy hauling. The first thing we do after the roadway is cut or filled is to cover it with a 12-in. cushion of sand to protect truck tires from wear and cuts. Normally, a certain amount of granular material goes over the rock; we see that it is put down right away."

The Campanella & Cardi equipment, distinctively painted with the company's standard color of bright orange, gave concrete evidence of being clean and well kept. Trucks and other units, even though they had been working for more than a year on the rugged job, still appeared to have their production-line newness.

"We pay careful attention to selection of drivers so that we get men who will take care of their machines," Cardi said. "We follow a regular schedule of periods between lubrication and other equipment checks.

"We grease our trucks twice a week with a special lube wagon that goes out to equipment in the field. Oil changes depend upon conditions. If the job is dusty, we change every 120 hours. If the job is excessively dusty, the air breathers are cleaned every day. We also periodically change the fluid in the gear reduction drive boxes."

Saves Time

The mobile lube wagon is ideally equipped for labor-saving speed. The truck body was specially built by Providence Body Co. and is mounted on a Ford F-800 chassis. Oil and grease are stored on the truck in the original drum containers and is dispensed by a set of Graco lubricators with hose reels. An Ingersoll-Rand 85-cfm Gyro Flo compressor supplies air pressure. The lubricators have 5A7 power heads and 5B7 pumps. The truck can supply all service requirements of trucks, shovels and dozers including air, water, gear lube, high pressure lube, track lube, hoist oil and motor oil. Sliding panel doors on the truck body provide quick access to the storage drums.

Major excavation items on both contracts were scheduled to be completed last month. Shovel loading and truck hauling, although hampered by heavy snowfalls, continued during the winter months.

"The outstanding construction angle about this job," said Art Hallam, assistant super for C & C, "is that it's mostly a truck hauling job. There are too many outcroppings of ledge rock and boulders that prevent us from using scrapers."

Scrapers were used only on section B for a limited amount of earth excavation. Five Cat DW21's assisted by two D9 pushers, took out about 200,000 yards of clay and till.

"Our first move on this job was to build an access road through the entire length of the job," Hallam said. "Then we dropped back and made cuts and fills to smooth out the way for a good haul road for over-the-road units. We needed those roads right away to haul out muck and bring in borrow.

"We have two major rock cuts in section C which run about 25 feet at their deepest points. We're building a wide right-of-way of 190 feet, including drainage. In rock cuts, the right-of-way measures a minimum of 186 feet from toe to toe of the rock banks."

The big 1055 shovel and the 71-B worked side by side in these rock cuts loading either the Mack heavy end-dumps or the bottom-dump Heiliners. Production during a 10-hour shift for the 3-yd. shovel was about 2,300 yards; for the 3½-yd. unit, output was about

Conference is held beside station wagon by Supt. John Ryan; Rico Cardi, partner in firm; Equipment Supt. Al Cardi; and Art Hallam, assistant job superintendent.

2,500 yards. The hauling units dumped 100% of the blasted rock into fill areas. Hauls generally were not over a mile. The rock was spread and leveled by a dozer and then covered with a sand cushion. The weight of heavy equipment traveling over the fills thoroughly compacted granular material into the voids between rock pieces.

Close to a million yards of dirt were shaped into embankments. About 500,000 yards of this borrow were obtained from one single large earth cut.

The roadway design calls for twin 50-ft. pavements with three travel widths in each direction and a 40-ft. depressed median. The pavement will have a 12-in. gravel sub-base; a 5-in. crushed stone base laid in two courses; and a 3-in. layer of hot top bituminous concrete laid in two courses. Shoulders of asphaltic concrete, varying between 8 and 10 feet, will be placed on either side of the triple-lane travel width.

Paving Quantities

About 337,000 yards of gravel, 135,000 yards of crushed stone and 90,000 tons of bituminous concrete will be placed in the two sections totalling 7.6 miles. The firm is buying all stone from local suppliers; gravel and borrow are the only materials being supplied from company pits.

Laying of base courses and paving will begin this spring. Sewer and underdrain installation and bridge building are now in progress.

An important contributing factor to the fast overall job progress has been the excellent drilling and blasting setup under the direction of Rock Superintendent Worley Powell. Powell, who has been superintending for C & C about two years, formerly was with Poirier & McLane Corp., New York City. He has been in the drilling and blasting game 19 years.

Rock breakup on the job is exceptionally good. The rock is a blue granite with seams running in all directions. Its appearance is similar to traprock. Mica is present in large quantities and the rock is quite hard to drill, wearing down the drill bits fast.

"Since the start of the job," Powell said, "there haven't been a half dozen pieces of blasted rock that wouldn't go down the dippers of our 3½ and 3-yd. shovels. We've got to get the rock fine because some of it is being hauled out in the Heiliner belly-dumps."

Powell was able to keep the rock supply ahead of the loading output of the two big shovels with only six crawler-mounted drills. The drills were Ingersoll-Rand CM-2 Crawl-IR units with a D45 drifter.

The Crawl-IR is a knee-action drill with a track-mounting driven by two air motors. All boom and feed tower adjustments are hydraulically controlled. The feed tower can be positioned for vertical, horizontal or angle drilling.

The twin air motors for propel are reversible and independently controlled for steering in any direction.

When an area is finished, the drawbar of the compressor supplying air power is hooked onto the drill and the Crawl-IR hauls itself and the compressor to a new area.

However, on the C & C job the air compressors were kept in relatively stationary positions. Three Ingersoll-Rand 900-cfm Gyro-Flo units provided air power through quick-coupling steel tubing. The air pipelines were 6-in. diameter.

The 900-cfm compressors give more than enough power, Powell said. "In fact, we even cut the air pressure down on the compressors to save breakage on drill steel."

Average drilling for each rig was 400 feet per 10-hour day. The hole diameter was 2¾ inches; depth varied between 26 and 35 feet. To insure a level floor in the rock cuts, the holes were drilled three feet subgrade.

Resharpen Bits

Gardner-Denver hollow drill steel was used in conjunction with Timken X-bits. The 1¼-in. x 10-ft. lengths had a hexagonal shape. Average bit life in ledge was about 2,400 feet with frequent resharpening. The bits were discarded after passing that mark.

Blast holes were drilled on 8 x 9 centers when the burden was 20 feet or less; on 7 x 9 centers when burden was over 20 feet. Between 30 to 100 holes generally were fired in a shot. Powder charges placed in these holes varied somewhere between 1 and 2½ tons. Powder factor was about ¾ pound per yard of material broken.

Economical grades of explosives in stick and powder form gave the required fine breakage. These chiefly were Atlas Gelodyne #1, a 55% powder, and Amodyne 3-H, an ammonium nitrate type explosive. No special gels were necessary.

Typical load in a hole 20 feet deep consisted of five sticks of Gelodyne #1 in the bottom of the hole, each stick

Power for drilling is supplied by two Gyro Flo 900-cfm compressors which push air through a 6-in. diameter steel pipeline.

weighing 6 pounds; 30 to 35 pounds of Amodyne powder; and about 7 feet of stemming.

The holes were wired in series with 20-gauge detonator wire. Atlas Rockmaster blasting caps were placed near the bottom of each hole.

Powell worked out a firing pattern that works out satisfactorily with respect to breakage and still controls the throw of stone. "Recently," he said, "we pulled a shot within 10 feet of powerlines overhead. We also have blasted rock 10 feet from a house placed on timber cribs waiting to be moved. The building wasn't touched."

Seismograph tests of the blasting vibrations were taken weekly by the contractor. The amount of powder permissible for a shot was determined accordingly.

Use Delays

A typical pattern had seven rows containing five holes each, for a total of 35. The holes were wired in series with delays 0 to 8. Delays were used between the rows only. However, the last hole on both ends of each row was jumped back to fire with the row behind. This jumping of holes was designed to keep down overbreak in the banks.

John Steele is resident engineer on the contract B section for the Massachusetts Department of Public Works. Horace Legacy is the resident on section C. Public Works Commissioner is Anthony N. DiNatale.

Campanella & Cardi personnel in addition to men already named include Joseph Poulin, master mechanic; Ray Iannucelli, office manager; and Mike Varatto, truck dispatcher. A total of about 125 men were employed during peak of the construction season on the contractor's route 93 work.

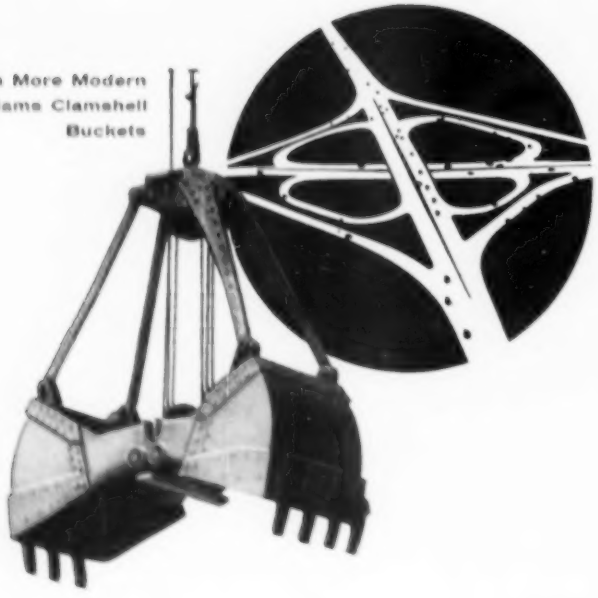
Campanella & Cardi specializes in road work and at any given time during the construction season has numerous widely scattered grading, paving and bridge jobs in New England states.

Completed last summer was a $4 million bridge approach job at Pawtucket, R. I. The work consisted of a mile of approaches to the main 695-ft. Paw-

Here are four of the six Ingersoll-Rand drills keeping the supply of blasted rock well ahead of the two loading shovels. Each rig drills 400 feet per 10-hour day.

Running the drilling and blasting show is Supt. Worley Powell, who has had 19 years experience in his line of work.

No Design More Modern
Williams Clamshell
Buckets



WILLIAMS BUCKETS

built to dig

Full Length Reinforcement
Takes Hard Knocks
Williams Dragline Buckets

Williams Bucket Div., The Wellman Engineering Co., 7000 Central Ave., Cleveland 4, Ohio, U.S.A. Branches: New York, 420 Lexington Ave.; Chicago, 520 North Michigan Ave.; Birmingham, 2809 Cahaba Road.

tucket River bridge plus seven smaller bridge structures. Also built was a $3.6 million expressway between Coventry and West Greenwich, R. I.

Underway last summer were a grading contract for a multi-million dollar urban renewal program in Providence, known as the West River downtown redevelopment; a series of seven Nike sites ringing Providence; four bridges at Smithfield, R. I.; and a concrete paving job at Otis Air Force Base on Cape Cod peninsula.

The firm has built facilities during the last few years for the Maine Turnpike and Boston's Southeast Expressway.

The company started bidding big contracts following a $15 million runway excavation and paving job in 1950 at an air field at Limestone, Me. The installation is now known as Loring air force base.

Concrete Plants

When the construction boom first started in the middle 40's, concrete was hard to get. Campanella & Cardi was gradually forced into setting up batch plants to supply its contract commitments. This diversification now ties in well with the construction division.

The concrete division growth has been explosive. Permanent plants are now located in Warwick, R. I.; Seekonk, Mass., just across the Rhode Island state line; and Sandwich, Mass., on Cape Cod. Thirty-five transit trucks deliver the concrete to customers and C&C construction jobs.

All ready-mix trucks are radio-equipped for efficient dispatching. The company has a total of seven base units for radio communication and 44 mobile units. All pickups and station wagons have RCA "Carfone" silent channel system radio equipment.

The Warwick plant features a Noble batching plant with electronic controls. It is capable of delivering a 1½-yd. batch every 45 seconds. Another feature of the plant is a vertical screw conveyor which automatically unloads bulk cement from railroad cars.

For paving operations, the firm uses two Rex pavers used in conjunction with Mack B-61 batch trucks with air-operated batch hoists.

Three asphalt plants located in Warwick, East Providence, R. I., and Fiskerdale, Mass., supply bituminous mixes.

The construction division's shops near Providence are modern and well kept. In addition to the equipment yard pictured it is "the neatest contractor's yard in New England."

SHRINKING PROFITS OR A BETTER RETURN ON INVESTMENT?

3 answers to the problem

With more bidders . . . low bid prices and rising costs . . . the pinch on profits demands a closer look at all phases of your operations. One of the surest ways to improve your profit picture is to use modern earthmovers with big power, big capacity and big performance. When considering equipment you have to weigh facts against fiction. The facts on these three big "Eucs" prove that they can cut your earthmoving costs and bring a better return on your investment.

TC-12

TWIN-POWER
CRAWLER

S-18

21-YD.
SINGLE ENGINE
SCRAPER

TS-24

24-YD. "TWIN"
SCRAPER

EUCLID'S BIG 3

No Design More Modern
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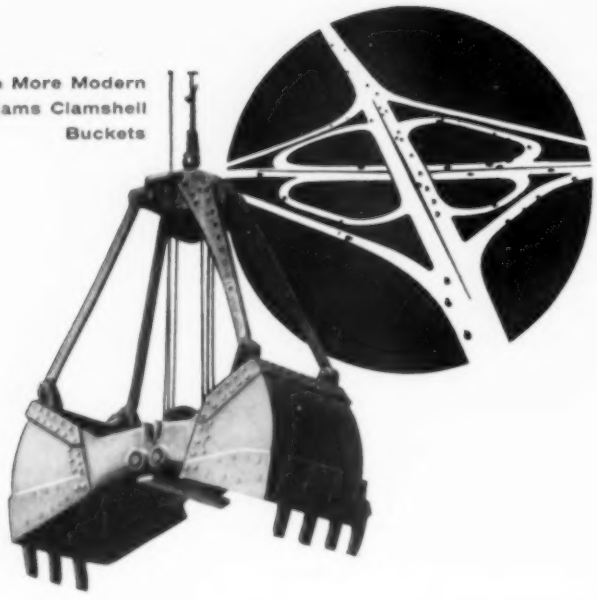

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24-YD. "TWIN"
SCRAPER

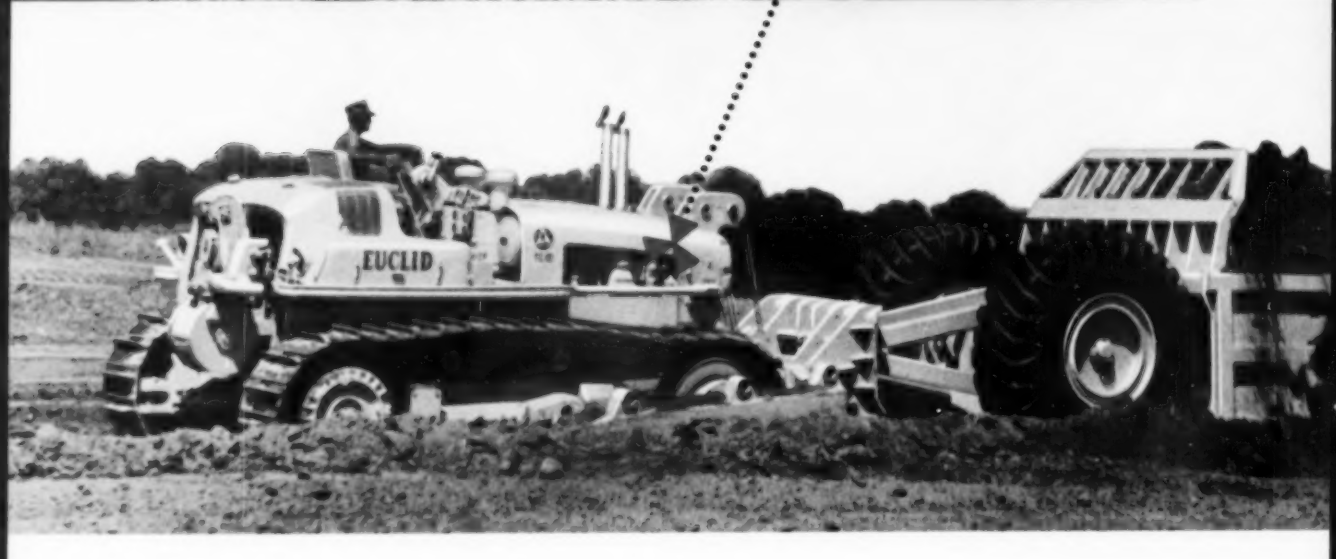
EUCLID'S BIG 3

Functional "years-ahead" design results in 5 major advantages

TWIN

TC 12

CRAWLER



21 to 30 yds.

Best all-around performer in its class!

S 18

SCRAPER

1. Twin Engines, with a total of 425 net h.p. and separate Torqmatic Drives, permit a completely new concept of crawler design. The TC-12 is years ahead of other tractors in its work-ability for push-loading, dozing, ripping and other big tractor work.

2. Independent Track Drives provide almost unbelievable mobility and maneuverability. With separate power trains and Torqmatic Drives, each track can work all of the time with its individually controlled speed and power . . . a big advantage for dozing and push-loading and for work on steep side slopes.

3. Easy, Fast Operation is achieved by Torqmatic Drives . . . one for each track. There's no master clutch . . . change from one speed range to another is made under full power . . . pivot turns can be made fast by reversing direction of one track. Operator has excellent visibility to front and rear, convenient controls and ample room for comfort.

4. Track Alignment is constantly maintained because each track is rigidly positioned to its main frame . . . each half of the tractor oscillates on a big diameter transverse shaft forward of and independent of the final drive.

5. Unitized Assembly of Major Components. Exceptional accessibility and unitized assembly of converter, transmission and drive case components, result in less downtime. For example, both drive sprockets can be removed and replaced in about one-third the time required for a competitive big crawler . . . final drives in just a fourth of the time.

Here's a big power, big performance team that paces the field in low cost yardage . . . the S-18 "Euc" Scraper of 21 yd. struck capacity and the TC-12 Twin-Power Crawler. With 425 net h.p. delivered to the power train and a separate Torqmatic Drive for each track, the TC-12 is the most powerful, most mobile crawler for push-loading. The S-18 loads fast and has a 336 h.p. engine with Torqmatic Drive and converter lock-up for high travel speed, outstanding grade-ability and efficient use of engine power.

Big Capacity of 21 yds. struck, 24 yds. at 3:1 slope and 30 yds. at 1:1 in the low, wide bowl originated by Euclid. By actual scale weight on job after job "Euc" scrapers carry more payload pounds than other scrapers of the same rated capacity.

Converter Lock-up with the 4-speed Torqmatic Drive assures maximum efficiency on grades and long, high speed hauls. The direct drive provides more usable power from the 336 h.p. engine without sacrificing the advantages of the torque converter.

Structural Strength without excess deadweight is built into the S-18 for long service life when push-loaded by the biggest tractors. Simple, rugged construction from push block to cutting blade results in lower maintenance and greater dependability.

Hydraulic Controls for all scraper operations—bowl, apron and ejector—eliminate the expense and downtime caused by cable breakage. All controls are fast acting and completely independent . . . permit controlled spreading of the load and non-stop dumping.

Out-in-the-Open Accessibility of all major components saves maintenance time . . . "package" disassembly helps get the machine back in production faster when repairs are required. Planetary drives and differential can be serviced without removing the wheels . . . engine, torque converter and scraper jacks are out in the open with easy access for servicing.

TWIN

TS 24

SCRAPER

More work-ability than any other scraper

Twin-Power permits the use of two torque converters, each driving a separate axle, to handle big loads under adverse conditions. Maximum usable horsepower of each engine is always available. Either or both engines can be used according to job requirements.

All Wheel Drive enables the "Twin" to self-load in most scraper materials . . . to pull out of soft sand . . . climb steep grades . . . to work when other scrapers bog down. There's no limitation of a power proportioner because each drive axle has its own power train.

Big Capacity of the "Twin"—24 yds. struck—makes it a high production earthmover. Heaped capacity at 3:1 slope is 27 yds. — at 1:1 it's 32 yds. The three independent hydraulic controls for bowl, apron and ejector give fast, positive action . . . help cut cycle time . . . and there's no downtime due to cable breakage.

More Versatility helps beat the profit squeeze. The TS-24 moves the cheapest dirt on big jobs and small ones . . . on work that "can't be done with scrapers" . . . can work independent of other equipment or team up with the TC-12 "Twin" Crawler for the high speed, big yardage projects.

Exceptional Availability of the "Twin" is evidence of Euclid's years-ahead engineering that cuts downtime to an absolute minimum. Major components—engines, transmissions, converters, drive axles, hydraulic jacks—are easy to get to for servicing and maintenance.

EUCLID'S BIG 3 will give you a better Return on Investment.

Performance data on the TS-24 "Twin" Scraper, TC-12 Twin-Power Crawler, and S-18 Single Engine Scraper is available from your Euclid Dealer . . . ask him for facts and figures or a field demonstration.

EUCLID

GM GENERAL MOTORS

Division of General Motors Corp.
Cleveland 17, Ohio

Printed in U. S. A.

Lightweight Diamond Drill Recovers Deep Cores

A 45-LB. portable diamond-core drill for exploration and test hole work, is being marketed by the Drill Division, Bucyrus-Erie Co., Richmond, Ind. Named the Winkie, the drill formerly was produced by the Wink Corp., Brookfield, Wis. Bucyrus-Erie acquired the Winkie in December 1958.

Fred W. Wink, who invented the drill and manufactured it in a plant at Brookfield, near Milwaukee, has joined the Drill Division. Wink developed the drill after spending about 20 years prospecting for minerals and oil in Brazil and northern Canada.

The Winkie, which supplements Bucyrus-Erie's line of water well, oil well and blast hole drills, will be sold throughout the world.

This typical setup for deep drilling of test holes uses a tripod for removal of long drill rods. Water supply is recirculated by means of the sump pump under tripod.

Inventor Fred W. Wink demonstrates removal of large-diameter cores from concrete pavement. Special short barrels are available for cutting cores up to 8-in. diameter.

One man can operate the Winkie, which is 19 inches high and 21 inches wide. It is powered by a 2-cycle, air-cooled gasoline engine producing 5½-hp at 5,000 rpm. Maximum bit speed is 2,000 rpm. In shallow drilling the Winkie can recover cores up to eight inches in diameter; $1\frac{5}{8}$-in. cores can be recovered down to 200 feet. The Winkie has a built-in water swivel. A patented overhead drive principle makes runs of 10 feet possible.

Protects Bit

The Winkie is designed to keep wear of the diamond bit to a minimum. All rotation on the Winkie is stopped automatically by a centrifugal clutch when engine speed falls below 900 rpm. The drill's top rotation speed, 2,000 rpm, and dynamic balance at operating speeds permit smooth penetration for maximum core recovery.

Normal fuel consumption is 2 to 2½ gallons per day. Water supply can be held to a minimum because all rotation

Continued on page 52

Air Force Housing Project Has Rush Schedule

Utilities specialists make ready sites for critically needed homes at air base.

by Ray Day

Bucyrus-Erie 30-B swings bucket of heavy gravel onto backfill pile. Dragline was brought in to dig ditches up to 20 feet deep and handle hardpan excavation.

AT McCHORD Air Force Base near Tacoma, Wash., a rush job for the United States Air Force has just been pushed out of danger in a nip-and-tuck battle with time. It consists of the hurry-up construction of 600 family living quarters authorized by Congress under the Capehart Housing Act.

The huge development—it covers nearly 250 acres—must be completed in a short period of 11 months, including site grading, installation of utilities from scratch and all building work. Construction, especially in the first stages, is particularly hectic because of the rush in getting graded areas ready for installing the first utilities and for building the housing units.

George A. Fuller Co. and Murray Sanders & Associates are the general contractors responsible for all work. The job was planned and designed jointly by three architectural-engineering firms: Besseti & Morse; McClure & Adkison; and R. W. Beck & Associates.

In many respects, site grading and installation of utilities are the most critical parts of the whole project. Since only 10 basic designs of buildings will be used, and over 75% of these will be in the form of duplex units, it will be possible for the Fuller firm to do many things to speed up building construction. For example, the standardized housing components can be cut, delivered, stacked and installed on an assembly-line basis. Trained specialty crews can be broken up to do their work the same way. These practices will make the job move rapidly.

Cat D7 owned by Milone & Tucci levels off top of spoil bank that will be used as haul route by trucks bringing in utilities pipe. The dozer also helps out on backfilling.

Glacial Deposit

Grading and utilities work, however, are considerably different. For one thing, the McChord Air Force Base housing site overlies a glacial gravel deposit which is anything but easy to dig. Trenching by conventional ditching machines is absolutely impossible because the formation is hard everywhere and is cemented into hardpan in many spots. Grading specifications were exceptionally rigid. They call for 95% of the modified AASHO density test under all house sites. Absolutely no organic material of any kind is to be placed under a housing site, and the top six inches of organic topsoil overlying the area must be separately stored for later use in landscaping.

Allis-Chalmers HD-20 dozer push loads a LeTourneau-Westinghouse model C Fullpak scraper on the Harrison 250,000-yd. grading contract. Second model C follows closely behind. Harrison is moving an average of 5,000 yards of material per day.

Since the layer of topsoil was not at all uniform at six inches, a considerable amount of selection and juggling became necessary to incorporate the remaining portion in fills which lay outside the direct housing areas.

Utilities-wise, some 88,000 linear feet of sewers up to 42 inches in diameter were called for, along with 42,000 linear feet of high-pressure water lines. While the layout looked good on the master plan, construction could be expected to take the form of a hodgepodge of activity. To make real speed possible, it would be necessary to work machines very closely together—much closer than is normally the custom. The reason for this was that the Directorate of Facilities Support, Headquarters, USAF, wanted rental area A started first and almost completed before work moved on into areas B, C and so on. And rental area A covers only about 10 acres.

Hire Subcontractors

Realizing that the success of the two most critical job items depended on skill, equipment and know-how of specialists in that work, the George A. Fuller management decided to call for subcontract bids. These were called for on a competitive basis, with only firms having well-established reputations invited to participate. When the smoke cleared, Harrison Bros. Co., Tacoma, Wash., had landed the site grading. Underground utilities and pipeline work was awarded to the Tacoma firm of Milone & Tucci, Inc.

Harrison Brothers' job superintendent is W. J. Gleason, who tackled the big grading task on an assembly-line basis.

John Deere rubber-tired tractor pulls a sheepsfoot roller over a fill. A mixture of glacial gravel and sand goes into the fills, which support the concrete slabs for buildings.

What has happened since, say project officials and managers of the two specialty contractors involved, is a perfect example of how modern equipment, wisely selected and used, will pay off. Mike Tucci, one of the co-owners of Milone & Tucci, said, "We simply couldn't have met the rush schedule Fuller wanted us to set if we hadn't had

Front-end loader pushes backfill into one of utilities lines ditches. Pipe sizes range from very small Transite lines through 12 to 42-in. diameter concrete sewer lines.

a policy of equipment staffing and maintenance well worked out in advance of this job."

Once the subcontracts were awarded, Fuller's management started pushing the two firms for all the speed they could get. Milone & Tucci couldn't work very fast until site grading was out of the way. Harrison Bros., on the other hand, was hampered by specifications. Short hauls, stockpiling of the organic topsoil and selection of organic material outside the direct housing areas all tended to make its work difficult. Despite these handicaps, Harrison Bros. kept one jump ahead of Milone & Tucci, who laid an amazing 25,000 feet of utilities lines in the first three weeks on the job and did even better in the later stages. They did it by double shifting their machines and working Saturdays.

Short Hauls

Since most of the Harrison firm's 250,000 cubic yards of excavation involved many short hauls, close maneuvers and the like, it was almost a perfect setup for high-speed scraper equipment. For that reason, the company brought in its three LeTourneau-Westinghouse model C Fullpak scrapers, two Allis-Chalmers HD-20 tractors for push loading, and an Allis-Chalmers HD-15 for miscellaneous dozer work. Two John Deere tractors and heavy-duty sheepsfoot rollers were brought in to handle compaction chores and two Caterpillar No. 12 motor graders were assigned to fine grade and finish the graded site. In addition to this equipment, Harrison rented two of its Bucyrus-Erie 22-B machines to Milone & Tucci for use on utilities installation.

W. J. Gleason is directing field operations for Harrison Bros. He tackled the job on as much an assembly-line basis as he could, first stripping the upper six inches of organic topsoil and stockpiling it in areas designated by the government. Following this, an organic topsoil and gravel mixture was dug out for use in fill areas outside the housing structure limits. Fills directly under concrete slabs on which the permanent housing units will rest are being built of the glacial gravel and sand mixture which underlies all the area.

Compaction is not easy. There's even one fine-print clause in the specifications which states that if 25 passes of compaction equipment do not get the required density, the material shall be considered "uncompactable" and presumably taken out and replaced with a better grade of material. Nevertheless, by placing the material in lifts not greater than from four to six inches and making about 12 passes with the sheepsfoot roller equipment, proper densities are being secured. Harrison Bros. production has averaged about 5,000 cubic yards per day through the early construction stages. Later, when grading and utilities work are far ahead of building construction, production can probably be slowed down somewhat.

Tough Digging

Of the two subcontracts, Milone & Tucci's is the tougher. Why? Because a glacial formation isn't the easiest in the world to dig or lay pipelines. Nor does the necessity for speed help matters.

For example, the most efficient meth-

Milone & Tucci's 11-B Transit Hoe digs the ditch for sewer lateral leading to the air base housing site. Machines are jammed together to keep job moving fast.

od to lay utility lines is to spread equipment out so that each has a fair chance to work without making a great number of moves between setups. Here, where moves are the rule rather than the exception, work takes the form of a gigantic construction chess game, moving equipment around as necessary. This was very efficiently accomplished by the planning of "Rolly" Rocher, general superintendent for the firm since 1955.

According to Mike Tucci, the firm in recent years has adopted a policy of buying late-model equipment, gradually gearing up to handle about $2 million worth of work a year, specializing in utilities installation. So, when the invitation to bid on this job came, the firm was well staffed with machinery. Even so, it was necessary to rent two Bucyrus-Erie 22-B's from Harrison Bros., and consideration also is being given to the rental of one more machine of similar size to help out.

So far as its own equipment was concerned, Milone & Tucci moved in its oldest machine—a Bucyrus-Erie 38-B hoe—to dig major sewer and waterline trenches up to 16 feet deep. A 30-B dragline, which the firm has owned for about a year and a half, was brought in for the excavation of ditches up to 20 feet deep. This machine also is digging into hardpan. Two 22-B hoes have been brought in for normal ditch excavation, and the newest rig—a Bucyrus-Erie 11-B truck-mounted hoe—was purchased recently for special small-scale excavation of ditches and excavation in hard-to-get-at areas.

Since conventional trenching machines were not even practical for excavating the house foundations, Tucci expected that the 11-B would be used on a rental basis there also. In addition to this group of excavators, the firm brought in a Michigan 175-A tractor-shovel for backfilling work; Jaeger mortar mixers for putting the pipelines together; a Caterpillar D8, recently purchased new for dozer and backfill work; and a Caterpillar D4 and an International TD-9. These machines are being used for all the miscellaneous jobs attendant on such a project and also for backfill.

Pipeline sizes run all the way from very small diameter Transite lines through concrete pipe from 12 to 42 inches in diameter. All pipe is being supplied by Lundberg Concrete Pipe Co. and is delivered by truck to the job and unloaded on the side of the trench opposite the stockpiles of excavated material. The hoes, in digging the trenches, try to dump the excavated material in such a way that it interferes least with pipeline laying crews and transportation in the area. Also to help out, M&T's Job Superintendent Wally Browe tries to get his pipe installed as rapidly as possible, tested with water with the joints exposed and backfilled promptly.

Busy Scene

Actually, the site looks like a proving ground for excavators. From almost any vantage point on the site, the casual visitor can see five or six machines working at once. Superintendent Browe makes an average of 50 miles a day in his pickup truck over the site just keeping the machines coordinated and working properly. The 38-B and 30-B machines have been on a double-shift basis since the job started and have also worked on Saturdays to get the biggest, deepest trenches out of the way. They have done so in spectacular fashion, with the result that over 1,000 feet of utilities per day have been maintained as a production rate ever since the job started.

According to Mike Tucci, the McChord Air Force Base job is the first real test his firm has had of its equipment buying and maintenance policies. The firm has been in business approximately 20 years, with Tucci an active partner since about 1950. Growth of the firm to a $2 million-a-year construction volume operation has built up largely over the past eight years.

Summing up, Tucci pointed out that his firm would somehow do the six months of work at McChord in the two or three months of rush scheduling. And most of the credit, he says, if credit can be given, goes to the well standardized new equipment he was able to move in when the pressure was put on.

Jim Milone, Tucci's partner, also was active in supervising the McChord AFB project. Joe Hazen is equipment superintendent for the company.

(Above) Milone & Tucci's General Supt. Wally Browe pores over some plans. (Below) Manhole construction was a bottleneck. It had to be kept ahead of the grading.

It Pays to Maintain Good Haul Roads

by John Radomsky
Supervisor, General Construction Section, Sales Development Div.,
Caterpillar Tractor Co., Peoria, Ill.

Today's high-production scrapers move heavy loads at high speeds. Haul roads with solid footing, shallow grades, gradual curves and good traction can improve machine performance.

MOVEMENT of large quantities of materials quickly and inexpensively is one of the most pressing problems facing contractors today. One answer lies in large, fast, efficient earthmovers. Frequently the potentials of these modern machines have been only partially utilized due to widespread inattention to the roads they travel.

Multi-million yard projects have become almost commonplace. Jobs of 200,000 yards, while numerous, are considered to be small. Highways are becoming wider, flatter, less sharply curved. Airport runways are being extended, spanning valleys and slicing through hills. The terrain is being fitted to the project, instead of the reverse as in the past.

To handle these job, contractors have demanded machines capable of high production. Scrapers must have fast travel speeds and large capacity. Pusher tractors must have the power to load scrapers in less than a minute. High production per unit has become the byword in the struggle for profits.

Although this attention has been focused on the haul units, like attention has not been given the haul roads. Heavy loads at high speeds tax haul roads, demanding solid footing, shallow grades, gradual curves and good traction. Contrary to many guesses, such roads are not an expensive luxury, available only to permanent operations. They can be profitable on short-time jobs, and can pay for themselves many times over with their contributions to economical high production.

Underfoot conditions are measured in terms of rolling resistance, or the drag on machine from the inability of the road to support the weight. With today's high axle loadings, it is becoming a serious problem to keep rolling resistance down to acceptable levels. This problem becomes acute in sandy and swampy areas.

Cement Soil

Under most conditions, rolling resistance can be reduced by mechanical compaction or the use of calcium chloride or cement. It becomes increasingly more difficult and expensive to further reduce rolling resistance as it approaches the 40 pounds resistance per ton of weight value. Normally, experience and common sense can be used to judge the rolling resistance desired for particular job conditions.

Many haul roads have soft spots caused by poor drainage. Culverts and fill material can be a good investment, particularly if a storm causes some spots to soften and bog down machines while the rest of the road is reasonably firm.

Modern diesel engines can speed heavy loads over haul roads, but their performance is reduced by grades of any magnitude. Long, steep grades can slow high-speed machines to a crawl. Frequently production gains will warrant cutting through or building a new road around such hills. Travel time will be reduced, and stresses on machinery will be lessened.

Sharp curves in the haul road can cause as much interruption in travel as narrow passages and crossing traffic (even with flag men for protection). Operators slow down for such areas, and time is lost in deceleration and acceleration. These bottlenecks may be profitably removed, or at least eased.

Good traction is a must, particularly when heavy machines must negotiate adverse grades. This problem is compounded by rains or running water. Ditches, crowning and culverts all can help keep dirt roads firm. A non-skid surface, such as gravel, may well be worth the expense to permit movement immediately after or during rains. All-weather roads may be worthwhile, particularly if dampness doesn't affect the material being moved.

Choice of machines is directly affected by these conditions. Poor rolling resistance or steep grades will necessitate ex-

Maintenance of the haul road is as important as its construction. A motor grader, properly used, can prevent buildup of knobs and resulting corduroy roadways. Blading should be deep enough to even the road, not just shove dust into the holes.

tra high horsepower. Transmissions and drive systems similarly must be matched to the terrain. Machines designed to cover all conditions must sacrifice simplicity and economy of operation. If the machines were to be operated only on good haul roads—with no steep grades, good traction and rolling resistance—they could be designed to provide maximum production at minimum cost. With the machines now on the market, larger loads can be carried more swiftly when haul roads permit.

Expense Rule

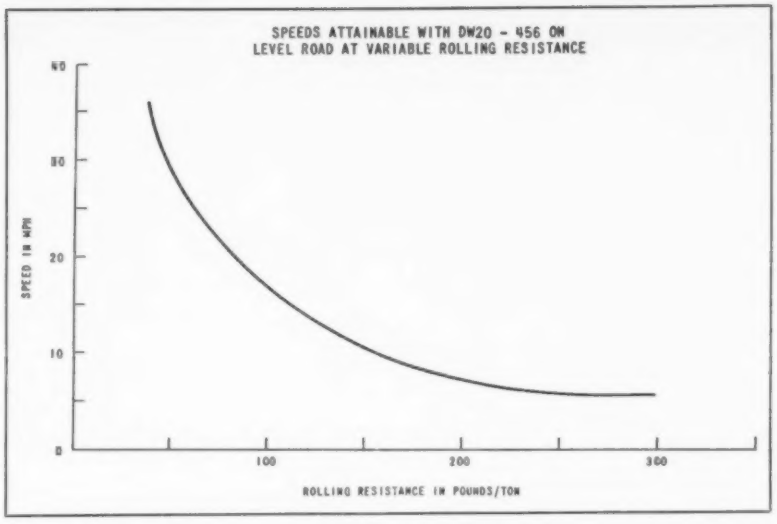
Agreed that good haul roads can prove to be money-savers, the question remains: How much can be spent to bring these roads up to desired standards? An approximation can be arrived at quickly and easily using (1) a simple rule; (2) machine specifications; and (3) the bid price of the material being moved. For the sake of illustration let's figure a road job with five 20-yd. scrapers, 33-cent dirt, 1,000-ft. haul and 12 to 20-mph travel speeds.

The rule is simple: cycle time equals fixed time plus variable time. Fixed time, including loading, dumping, acceleration and deceleration, is about three minutes when operating in top gears. Variable time can be found by dividing the haul and return distance (2,000 feet) by travel speed in feet per minute (1 mph equals 88 feet per minute). So, we would figure a 1,000-ft. haul at a speed of 13 mph like this: Cycle time = 3 minutes + (2000 ÷ 1144) = 4.8 minutes. At 14 mph, cycle time would be 4.6 minutes.

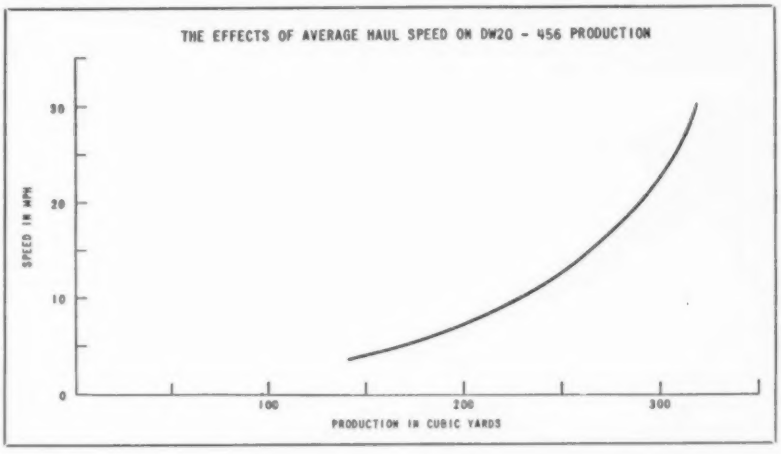
In this 12 to 20-mph range, each mile per hour gained in travel speed by the 20-yd. scraper will result in about 5 yards more material moved per hour, considering the machines will work about 45 minutes out of an hour.

With the five-unit fleet described above, a gain of 3 mph will yield an extra 75 yards per hour without additional equipment and will also give free extra road safety and machine life. Moving 33-cent dirt, the contractor could spend up to $25 additional on the haul road for each hour the machines roll over it. On a 100,000-yd. cut, a 3-mph gain would justify up to $2,400 more expenditure on the road.

With the extra money available for improving the haul road, where should it be invested to do the most good? Too many contractors with a haul road problem merely assign another grader to patrol the road. The operator's instructions are to keep the road smooth and stay out of the scraper's way. Such attention rarely produces the desired results.



(Above) Graph shows how rolling resistance quickly pulls down scraper speed. Under most conditions, rolling resistance can be reduced by mechanical compaction or the use of calcium chloride or cement. (Below) Production jumps with faster speeds.



Frequently the haul road is simply a bulldozer trail slicked up with a few passes of a motor grader. Chuck holes are filled with loose dirt, soft spots are capped by some dry dirt and a few rocks. The first pass of a heavy scraper reopens the chuckholes, and the dry material packs down into soft spots. Succeeding sweeps of the big haul units deepen the ruts. The road becomes rough, and the operators slow down their scrapers to stay in their seats, if not to keep from tearing up their machines. Poor drainage and flying dust add to the problems. A grader knocking dust into the ruts adds to the confusion. Some contractors have tried larger graders to speed this grading, but the basic condition still exists—the road is inadequate.

Instead, the contractor would do better to re-evaluate the haul road. Holes and soft spots should be filled and compacted. Ditches and drain pipe should be installed to carry away water. Chemical agents might be added to reduce dust, if this is a hazard. The work can be accomplished with the equipment already on the job. Scrapers and bulldozers can supply the fill. A few passes of the compactor can firm up the road. A motor grader can crown the road and cut drainage ditches. After the road has been put in good shape, only occasional passes of the motor grader will be necessary to remove bumps and spilled material.

Haul roads are a good investment, and are not a luxury of long-term operations. They can more than return their value in increased production, greater safety and less costs for operation and maintenance.

Award winners shown with gold-plated Beavers trophies are John MacLeod (left), James L. Lovell, L. J. Sverdrup, L. E. Dixon, Charles P. Dunn, O. S. McCormick and H. E. Carleton. Admiral Ben Moreell (not shown) was given a special award.

News from the Field

Beavers Honor Eight

Eight prominent figures in heavy engineered construction were honored at the fourth annual Beavers awards dinner held January 15 at the Biltmore Hotel, Los Angeles, Calif. More than 1,100 members of the Beavers, whose roster reads like a *Who's Who* of the construction and engineering business, attended the black-tie affair. Handsome gold-plated trophies denoting outstanding achievement were presented in the following divisions:

Management: L. E. Dixon, president, L. E. Dixon Co., San Gabriel, Calif.; and John MacLeod, president, Macco Corp., Paramount, Calif.

Supervision: H. E. Carleton, vice president, Coker Construction Co., Omaha, Neb.; and O. S. McCormick, Al Johnson Construction Co., Minneapolis, Minn.

Engineering: Charles P. Dunn, International Engineering Co., San Francisco, Calif.; and Gen. L. J. Sverdrup, Sverdrup-Parcel, Inc., St. Louis, Mo.

Supply: James L. Lovell, of the Los Angeles office of E. I. du Pont de Nemours & Co.

A special award for Admiral Ben Moreell, who organized the Seabees during World War II and who is now chairman of the board of the Jones & Laughlin Steel Corp., Pittsburgh, Pa., was accepted by Admiral E. J. Peltier of the U. S. Navy Bureau of Docks.

Ray F. Rasey, president of Winston Bros. Co., Arcadia, Calif., and Minneapolis, was elected president of the Beavers organization. He succeeds J. M. Sawyer of the Macco Corp. Other officers named during the meeting are: Paul L. Grafe, Los Angeles, senior vice president; Edgar F. Kaiser, Oakland, Calif., vice president; and J. P. Shirley, Jr., J. W. Watson and James L. Lovell, all of Los Angeles, secretary-treasurer, assistant secretary treasurer and ambassador of good will, respectively.

Cawdrey Heads AGC

James W. Cawdrey, Seattle, Wash., was installed as 1959 president of the Associated General Contractors of America at its 40th annual convention at Miami Beach, Fla., in January.

John A. Volpe of Malden, Mass., took office as vice president.

Cawdrey served as vice president of the association in 1958 and, according

Notice of Correction

On page 16 of an article entitled, *Smoky Mountains Make Room for Interstate Highway*, published in the January 1959 issue of EXCAVATING ENGINEER, statements were made relative to a concrete dam "suffering from extensive water seepage," and of fear on the part of the owners that "a series of sizeable explosions might further weaken the structure."

It has been called to our attention that the above-quoted statements are erroneous. Upon further investigation, we feel that we should publish this notice of correction. We have been authoritatively advised that:

(1) The dam in question is not suffering from abnormal water seepage and is not weak.

(2) The dam, an arch structure, was built about 30 years ago under a license issued by the Federal Power Commission and according to engineering plans and specifications approved by the Commission. It has been inspected regularly by Commission engineers, as is customary in the case of licensed projects.

(3) The dam continues to have the unqualified approval of the engineers of the Commission.

(4) The restrictions set up in regard to the use of explosives in nearby road construction were the result of carefully planned measures worked out jointly by the engineers of the Commission and engineers of the Utility. The restrictions were solely precautionary measures, in consideration of the type of structure involved, against damages that could be caused by intensive vibrations resulting from explosions.

We are happy to publish the foregoing notice of correction of the above-quoted statements.

to custom, was elevated to the top AGC post. He succeeds Fred W. Heldenfels, Jr., highway contractor of Corpus Christi Tex. Cawdrey is a member of the building firm of Cawdrey & Vemo, which has constructed many buildings in the Seattle area. He has been active in AGC affairs both on the national and local level for many years. He was president of the Seattle chapter of AGC in 1949.

James W. Cawdrey (left), is AGC's president and John A. Volpe, vice president.

Volpe, besides being active in AGC affairs, has been prominent in public life. He served as interim federal highway administrator when that office was first created by Congress. He also served a term as Massachusetts commissioner of public works.

New officers of the three AGC occupational divisions who were installed were:

Building contractors' division: Robert W. Long, Long Construction Co., Kansas City, Mo., was elected chairman to succeed Ira H. Hardin of Ira H. Hardin Co., Atlanta, Ga. Carl W. Olson, Olson Construction Co., Lincoln, Neb., was elected vice chairman.

Highway contractors' division: J. P. Gibbons of Gibbons & Reed, Salt Lake City, Utah, was elected chairman to succeed Max C. Harrison, Harrison Construction Co., Pittsburgh, Pa. H. L. Royden of the Royden Construction Co., Phoenix, Ariz., was named vice chairman.

Heavy construction and railroad contractor's division: Howard H. Sturdy of the Dravo Corp., Pittsburgh, was elected chairman, succeeding Chas. L. Harney of Chas. L. Harney, Inc., San Francisco, Calif. Charles Keller, Jr. of the Keller Construction Co., New Orleans, La., was elected vice chairman.

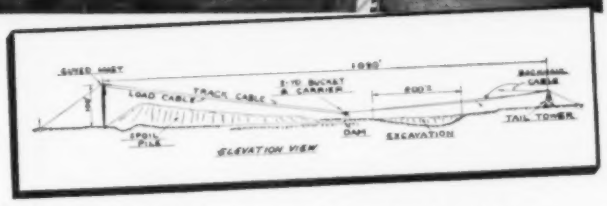
Steel Company Opens New Mesabi Mine

Jones & Laughlin Steel Corp., Pittsburgh, Pa., has started stripping and development operations on an ore mine which should be an active producer of

Continued on page 42

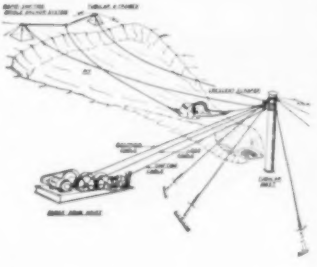
Three Sauerman Methods for Cutting Excavating and Reclamation Costs

DIGGING and CLEARING



Slackline Cableway—A 2-yd. bucket is used to maintain a clear channel to an irrigation project. The cableway digs the hard packed silt and conveys it to a spoil pile on the downstream side of the dam. Method permits removal of silt without wasting water.—*Sauerman News No. 146.*

RECLAMATION TO HOPPER



DragScraper—A 4-cu. yd. DragScraper digs sand and gravel from a wet pit and hauls it 400 ft. to grizzly hopper. This new machine handles increased plant demands in one shift. Two were required with the former installation.

—*Sauerman News No. 144.*

UNDERWATER TRENCHING

DragScraper and Crane—Here's how a DragScraper used with a carrier and track cable can extend the reach of any crane. This arrangement was highly successful in digging a trench for underwater pipe and backfilling after pipe was laid. —*Crane-DragScraper information is available in Field Report No. 228.*

Find out what the Sauerman Method can do for you

Give us details on your operation. Our engineers will give prompt recommendations and work with you to provide the best method for your requirements. Ask for Catalogs A (DragScrapers) and C (Slackline Cableways).

SAUERMAN BROS., INC. 622 SO. 28th AVE. BELLWOOD, ILL.
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HEADQUARTERS FOR YOUR BEST BUYS IN USED EQUIPMENT!

Your Caterpillar Dealer's lot holds the best selection of used earthmoving equipment buys on the market. Here's why: His business is active—and he reconditions, classifies and guarantees his trade-ins so you *know* what you're getting. Here's how:

1 **A "BONDED BUY"** on used Cat-built equipment is your safest buy. It's a bonded guarantee, up to $10,000 of satisfactory performance on *all* parts during the guarantee period.

2 **A "CERTIFIED BUY"** covers units of any make in good condition. This type of protection carries your dealer's written guarantee of satisfactory performance.

3 **A "BUY AND TRY"** deal is just what its name implies. This protects you with your dealer's written money-back agreement.

Only Caterpillar Dealers offer this protection. You'll find your dealer listed in the Yellow Pages. For your best buys in used equipment, visit his lot today!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

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BEST BUYS IN NEW AND USED EQUIPMENT

News . . .

Continued from page 41

high-quality beneficiated iron ore for many years.

The property, which is known as the Lind-Greenway mine, is located in Minnesota on the extreme west end of the Mesabi range. It will be operated as a part of J & L's Minnesota Ore Div.

The mine is expected to produce approximately 700,000 gross tons of high grade beneficiated ore per year, according to C. C. Henning, J & L's manager of ore mines and quarries. This is approximately 10% of J & L's blast furnace requirements.

The mine will be novel because it will consist of two separate open pits, one on each side of Minnesota's Prairie River. The pits are connected by a truck haulage bridge.

Crude ore will be mined by conventional power shovel methods, and hauled by heavy-duty trucks to a concentrator. It will then be washed or given a heavy media treatment prior to shipment. Initially, only the wash ore plant will be constructed with heavy-media units added as leaner ores are encountered.

The mine will employ approximately 200 men when full production is reached. Adolph C. Seaberg is superintendent of the new mine. He formerly was general foreman at J & L's Hill-Annex mine.

Peak Year for Highways

Capital highway expenditures (the costs of right-of-way and construction) are expected to reach $7.1 billion in 1959, according to a report issued by Bertram D. Tallamy, federal highway administrator. This record total will be a 15% increase over 1958.

The construction part of the 1959 capital expenditures total is expected to be $5.75 billion, up 12% over the previous year.

A comparison of capital expenditures by all levels of government on the federal-aid and other highway systems is shown in the table below. These estimates were compiled by the Bureau of Public Roads, U. S. Department of Commerce.

Water Resources Map Depicts Federal Projects

A new water resources map showing the expansion of flood control, irrigation, navigation and power developments by the Army Corps of Engineers, the Bureau of Reclamation and the Tennessee Valley Authority over the past five years is now available.

The new publication brings up to date the federal government's official water resources map to show the projects completed and new work authorized since the previous map was published in 1953.

The map can be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at $2.25 each.

Included are over 300 new Corps of Engineers and 35 new Bureau of Reclamation projects, embracing multipurpose projects serving water supply, recreation, fish and wildlife as well as flood control, irrigation, power and navigation. These projects, costing the Corps and the Bureau $1.7 billion and $1.2 billion respectively, have been added to the programs authorized by previous congressional actions.

Since 1953, 11 new Bureau of Reclamation storage dams have been completed or brought under construction, and an additional 20 authorized. These structures when completed will provide 34,169,000 acre-feet of storage capacity in the West.

Shown on the map are the 23,000 miles of improved inland waterways and the approximately 500 major harbors developed, operated and maintained by the Army Engineers.

A large growth in hydroelectric power installations is also reflected by projects completed within the past five years. The Corps of Engineers now has 31 powerplants in operation, with an installed capacity of 5.8 million kilowatts. Five years ago there were 14 projects in operation, with installed capacity of 1.7 million kilowatts.

There are now 35 powerplants with an installed capacity of 5.1 million kilowatts associated with Bureau of Reclamation projects.

	(In millions)			
Capital Highway Expenditures	1956	1957	1958	1959
Interstate system	$1,282	$1,699	$2,189	$2,844
Other federal-aid systems	2,376	2,498	2,401	2,653
Other state roads	268	245	347	283
Other local roads and streets	980	1,030	1,094	1,160
Not classified	91	133	176	198
Total	$4,997	$5,605	$6,207	$7,138

PROJECT PAYDIRT *pays off for you again*

NEW Caterpillar No. 933 Series F Traxcavator delivers up to 22% more production

The new Caterpillar No. 933 Series F Traxcavator with a larger, 1⅛ cu. yd. bucket is ready now to set new production records. It is the latest achievement of Caterpillar's "Project Paydirt*."

Field tests on a variety of jobs and working conditions proved the new Series F delivers *up to 22 per cent more production* than previous models of this popular machine.

The power source of the new No. 933 is an efficient new 52 HP Cat Diesel Engine. It features a new cylinder block, engine balancer for smooth performance, unit-serviced fuel pump, and a side-mounted starting engine for compactness and economy.

A new transmission and a heavier final drive give the new No. 933 the speed and stamina to maintain quick, easy loading and faster cycling. Cycle time is further shortened by a high-speed reverse—3.67 MPH.

The new machine features greater operator comfort and efficiency. All controls are conveniently visible. Leg room is ample. The mechanical advantage of the steering clutch brakes has been increased 30% for easier operation. A new, larger seat is more comfortable, continues to provide good visibility, both front and back.

And the new No. 933 retains the superior design features that have made Traxcavators first choice on jobs throughout the world. The exclusive oil clutch, automatic bucket controls, 40° tilt-back, heavy-duty undercarriage, unit design and construction — to name just a few. And the exclusive Side Dump Bucket is available to add versatility.

Get the complete story on the new No. 933 from your Caterpillar Dealer. Ask him to demonstrate how this Traxcavator can step up production on your job.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

HIGHER PRODUCTION and more profits are possible with the new Caterpillar No. 933 Series F Traxcavator featuring a 1⅛ cu. yd. bucket.

* ***PROJECT PAYDIRT:*** Caterpillar's multi-million-dollar research and development program — to meet the continuing challenge of the greatest construction era in history with the most productive earthmoving machines ever developed.

CATERPILLAR

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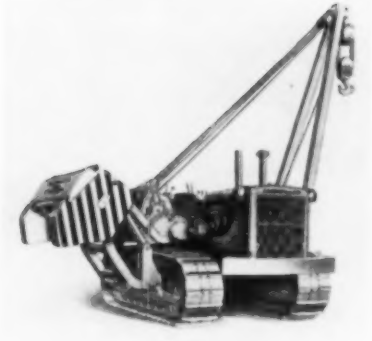
BORN OF RESEARCH
PROVED IN THE FIELD

Equipment You Ought to Know About

Big Pipelayer



Manufacturer: Caterpillar Tractor Co., Department EE, Peoria, Ill.

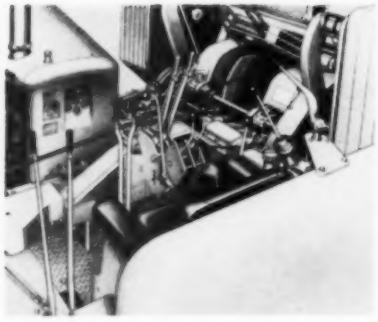
Claims: Increased lifting capacity and greater horsepower are two major benefits that pipeliners can expect from the new Caterpillar Series H No. 583 pipelayer.

A brief specification analysis of the machine shows that its weight is 83,840 pounds; flywheel horsepower is 225, compared to 191 on the Series E; and lifting capacity, at 4-ft. overhang, has been upped to 137,000 pounds.

Coupled with its increased weight and power, the new No. 583 has a top speed of 6.4 mph, an increase of 1 mph over the old model. This design feature is intended to meet the contractor's desire for high travel speed during such maneuvers as moving to a forward position after completing a lowering-in operation.

Higher horsepower is obtained with a turbocharger on the pipelayer engine. The turbocharger is an exhaust-driven turbine which packs more usable air into the cylinder to increase combustion efficiency.

An undercarriage feature of great importance to the machine owner is the lifetime lubricated rollers and idlers.



These undercarriage components are lubricated at the factory, and require no further attention until rebuilding. This advantage is made possible by completely new floating-ring seals and rubber rings.

As an operator-convenience feature, primary pipelayer controls—clutch and brake controls for the winches—are console-mounted directly forward of the operator's right arm position. In this respect the control arrangement is similar to that which has gained wide popularity on the Cat No. 572 pipelayer. The clutch and brake control for each drum line are in line, with the brake directly in front of the clutch. Both sets of controls are directly in front of the right arm rest. The boom and load line brake levers are spring-loaded to prevent accidental lowering.

Counterweight design is also similar to the No. 572 pipelayer. This arrangement has a bottom pivot, rotating to the counterweights upward and out from a second pivot point on the counterweight frame. This design provides high ground clearance beneath the counterweights during extension, and better advantage from each pound of extendible weight. It also provides for complete retraction of the weights over the track, a factor for steering ease when the machine is operating with no load.

Action of the counterweights is governed by the new Caterpillar No. 143 hydraulic control, through two 4-in. diameter cylinders. This control has the ability to fully retract the counterweights from an extended position in six seconds.

Mobile Pile Hammer

Manufacturer: Gardner-Denver Co., Department EE, Quincy, Ill., and Vulcan Iron Works, Department EE, Chicago, Ill.

Claims: A new mobile "Trac-Hammer" that can be used for a variety of concrete breaking, pile driving or drilling operations has been announced by Vulcan and Gardner-Denver.

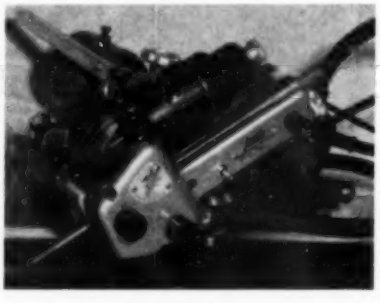
The Trac-Hammer is an application of the Vulcan portable pile hammer adapted for use on Gardner-Denver's Air Trac drilling rig. Through the self-propelled Trac design and the location of the mast on which hammer and drill are interchangeable, the rig can work indoors, reach corners, and perform in other areas formerly considered inaccessible with mobile equipment.

Towing its own compressed air supply, the new machine features an all-angle boom enabling it to drive piles or drill holes from virtually every position.

When pile driving is called for, the hammer can be united with the Air Trac by a mounting bracket attached to the mast. No mast modification is needed in the changeover nor are special tools required.

The hammer operates from an air pressure of 60 psi and is capable of delivering 303 blows per minute with a "striking part" weight of 100 pounds. It has a rated striking energy of 386 foot-pounds. The hammer weighs 786 pounds, complete with striking plate.

Air-Jet Torch



Manufacturer: Arcair Co., Department EE, Box 431, Lancaster, Ohio.

Claims: Arcair has introduced a spe-

cial automatic torch designated model Q-3. Like other Arcair torches, it uses an electric arc to melt metal while simultaneously a jet of compressed air blows the molten metal away.

One of the uses of Arcair torches is to prepare joints for welding. The unit consists of a head with an electrode feed mechanism which feeds consumable copper coated carbon-graphite electrodes as required and supplies a jet of air at the proper location.

The head is mounted on a tractor permitting straight line or circular travel at pre-determined speed. When positioning is required, the Q-3 head can be removed from the tractor and mounted on the positioning equipment in the same manner as an automatic welding head.

With this completely mechanized Arcair torch, machine-quality grooves are easily prepared at the welding location, eliminating moving the work to burning slab or planer. The head can be set at any angle with the work to produce a variety of grooves and bevel contours. It will handle Copperclad Arcair electrodes from $^{3}/_{16}$ to $^{1}/_{8}$-in. diameter inclusive, and the tractor has a speed range of 0 to 180 inches per minute.

Low-Bed Trailer for Tractors

Manufacturer: International Harvester Co., Department EE, 180 N. Michigan Ave., Chicago, Ill.

Claims: International's No. 130 low-bed trailer is designed for use by implement dealers and contractors for transporting tractors and construction machinery. It is a six-wheel unit with 13,000-lb. rated capacity.

The trailer is equipped with rubber-mounted torsion axles which act as a combination spring and shock absorber and work equally well whether the vehicle is loaded or empty. Independent oscillation of each wheel enables smooth movement of the trailer when pulled over rough terrain or at normal highway speeds. This exclusive wheel suspension design eliminates such vexing problems as metal to metal friction, parts replacement and lubrication.

The all-steel, single-unit welded angle frame gives stability and balance to the entire trailer bed, which consists of 2-in. unfinished wood. A ramp for fast one-man loading and unloading operations also serves as the unit's tailgate.

A jack built into the hitch allows the trailer to be loaded when the towing vehicle is disconnected and facilitates connection of the two.

Over-all width of the No. 130 is 8 feet; over-all length, 21 feet. Bed width measures 77½ inches; bed length, 16 feet. Basic weight is 1,900 pounds.

Two, four and six-wheel electric brakes are offered as optional equipment.

45-Ton Transit Crane

Manufacturer: Bucyrus-Erie Co., Department EE, South Milwaukee, Wis.

Claims: A new 45-ton model 30-B Transit Crane has been announced by Bucyrus-Erie. The crane can lift a maximum load of 45 tons with a 40-ft. boom at a radius of 15 feet. The machine can be used as a 1 to 1½-yd. hoe, 1 to 1¾-yd. shovel, 1 to 1½-yd. dragline and as a clamshell.

The new crane, which will reach 140 feet with jib, has a boom fabricated of Tri-Ten steel featuring extra strong chord angles and larger cross sections. Point sheaves are mounted on pre-sealed, permanently lubricated anti-friction bearings.

New features include an air-operated boom hoist and engine master

Continued on page 46

FOR 50 YEARS...
Finest in the Field!
Rely on the bucket contractors rely on. The Omaha Dragline Bucket gives full load with every cast. Perfect balance makes it easy to spot dump. Alloy steel cutting teeth stay sharp, tough and ready. Strike pay dirt now! Complete information and specifications await your letter.
DRAKE-WILLIAMS MOUNT • OMAHA, NEBR.
OMAHA
DRAGLINE BUCKETS

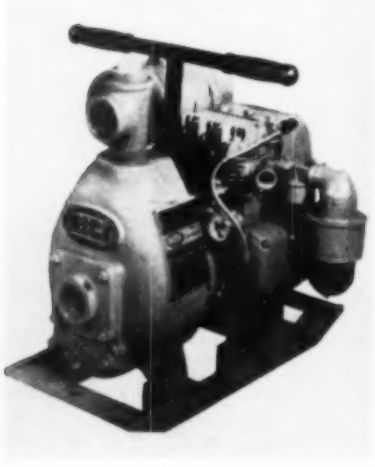
New Equipment . . .

Continued from page 45

clutch to complement the 30-B's air-control system; adjustable cone rollers; and a 6 x 4 or 8 x 4 carrier with gas or diesel engine. The carrier is especially designed and built so that the Transit Machine performs equally well in crane or excavator service.

Also featured on the new 30-B Transit Crane are a two-speed gear box, single-piece counterweight, heavier A-frame, hydraulic jacks, and for machines with torque converters, two-lever dual governor control.

High-Head Pumps



Manufacturer: Rice Pump & Machine Co., Department EE, Belgium, Wis.

Claims: A complete new line of self-priming high-head centrifugal pumps in sizes 1½ thru 6 inches has been introduced by Rice. Pumps are available with base mounting, pneumatic tires or steel wheels. The units may be driven by belt or by flexible coupling or may be direct connected to the engine.

Sizes 1½ thru 3 inches are available with electric or air-cooled gasoline power. Sizes 4 through 6 inches are available with electric, gasoline or diesel power. In addition to the high-head models, Rice offers a complete line of low-head, high capacity self-priming centrifugal and diaphragm pumps.

Gas Line Filter

Manufacturer: Carter Carburetor Div., Department EE, ACF Industries, Inc., St. Louis, Mo.

Claims: A ceramic and magnetic gasoline filter designed for installation directly into the fuel line of any gasoline engine, stationary or rolling equipment,

has been announced by Carter Carburetor.

The new product, called the Carfilter, also has application in automotive and marine gasoline engines. It is being marketed nationally, and retails for $3.95.

The in-the-line filter performs a complete filtering function, ridding the fuel of harmful dirt and iron oxide particles, and preventing clogging, flooding and stalling. The unit, developed and tested over a two-year period, will be packaged individually with hose fittings and clamps to simplify installation. Directions are included on each package.

Carter engineers who developed the device explained that, if the filter should become clogged by foreign material, a built-in by-pass pressure relief valve allows passage of sufficient gasoline to run the engine until the filter—which is disposable—can be replaced. The 40-micron fine-texture ceramic filter allows filtering in "depth" rather than only on the surface area. A magnetic trap catches otherwise unfilterable iron particles.

"Your order comes to exactly 192,000 dollars and 90 cents. Will that be cash or charge?"

80-Hp Motor Grader

Manufacturer: Allis-Chalmers Mfg. Co., Department EE, Milwaukee 1, Wis.

Claims: Allis-Chalmers has added to its construction machinery line the model ONE FORTY FIVE motor grader. It is an 80-hp, 21,540-lb. unit designed as a medium horsepower and weight classification motor grader capable of heavy-duty work. The new grader increases to three the number of models Allis-Chalmers has available in sizes ranging from the 58-hp model D to the 120-hp model FORTY FIVE motor grader.

The ONE FORTY FIVE tandem drive motor grader is powered by an A-C four-cylinder diesel engine that develops 80 hp at 1,800 rpm. It has six forward speeds ranging up to 20.3 mph, and three reverse speeds up to 7 mph.

The ONE FORTY FIVE is capable of cutting a 90° maximum bank with its 12-ft. moldboard for back sloping highway cuts and ditch construction. A wide shoulder reach outside the front wheels gives the unit an advantage for such work as grading soft highway shoulders. It has a power-actuated, fully reversible circle turn.

Power-operated leaning front wheels and a full 6,500 pounds of weight on the front axle give the new motor grader extra resistance to side thrust of big moldboard loads and provide front-end stability.

For operator comfort and safety the new grader has a wide, roomy and unobstructed operator's deck free of brake and clutch pedals.

Special equipment that adapts the motor grader to a wide range of special conditions includes power hydraulic steering; hydraulic shiftable moldboard; heavy-duty scarifier; V-type snow plow and wing; and a range of special tire options. Special painting at the factory of any color other than the standard Persian Orange is also available.

THE 40-R

Ability to handle the most punishing work and be ready when you need it makes the BUCYRUS-ERIE 40-R the most outstanding rotary drill on the market, under all drilling conditions

In Granite-Hard Formations operator can exert maximum down pressure on the bit for most effective penetration.

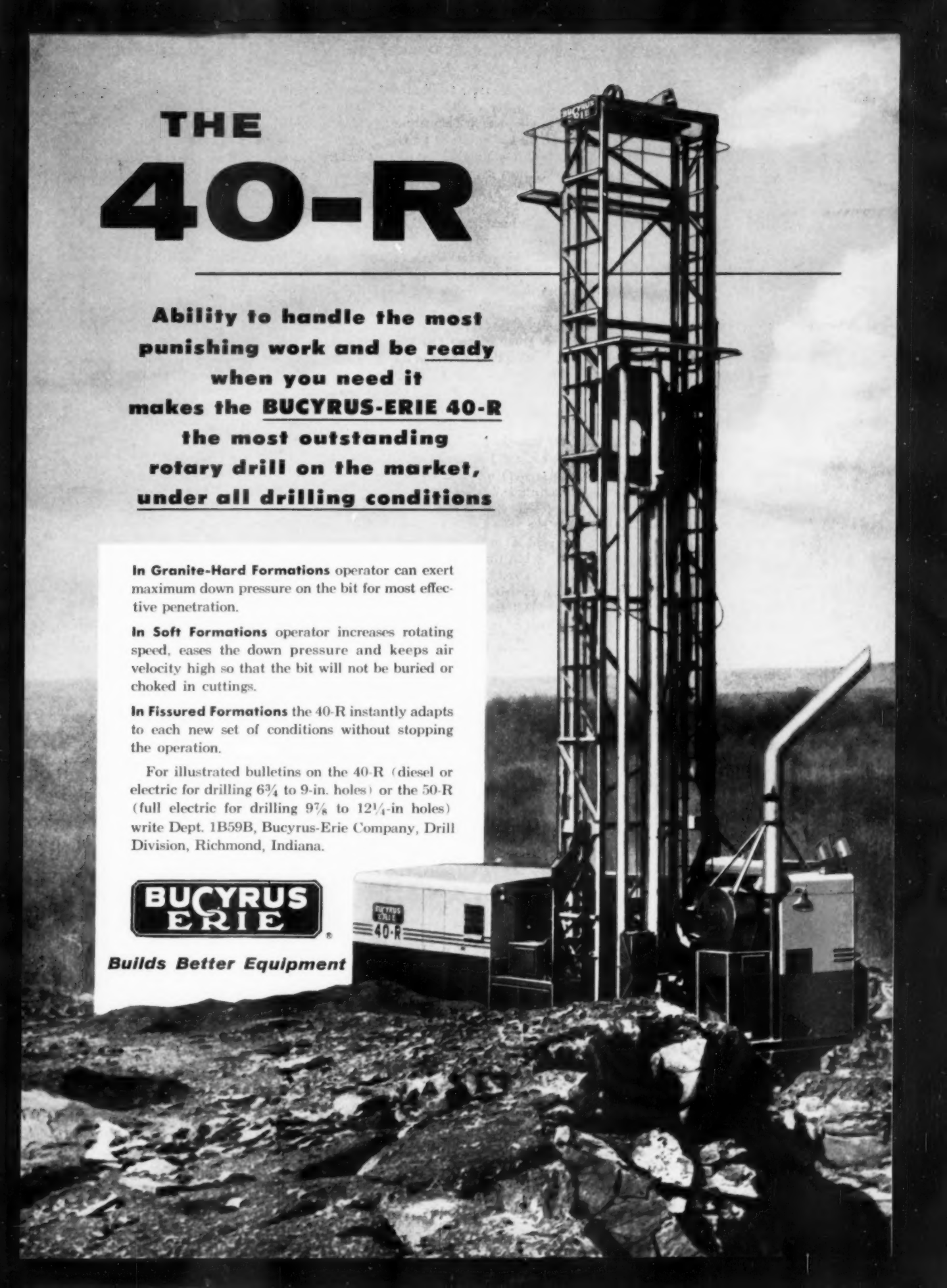
In Soft Formations operator increases rotating speed, eases the down pressure and keeps air velocity high so that the bit will not be buried or choked in cuttings.

In Fissured Formations the 40-R instantly adapts to each new set of conditions without stopping the operation.

For illustrated bulletins on the 40-R (diesel or electric for drilling 6¾ to 9-in. holes) or the 50-R (full electric for drilling 9⅞ to 12¼-in holes) write Dept. 1B59B, Bucyrus-Erie Company, Drill Division, Richmond, Indiana.

BUCYRUS ERIE®

Builds Better Equipment



NOT in the Contract

A stingy husband, while out of town, sent his wife as a present a check for a million kisses. The wife, a little annoyed, sent back a post card: "Dear Jim: Thanks for the birthday check. The milkman cashed it for me this morning."

John Smith witnessed a minor holdup. In due time the police arrived, and one officer asked the witness his name.

"John Smith," said Smith.

"Cut the comedy," snapped the cop. "What's your name?"

"All right," said Smith, "put me down as Winston Churchill."

"That's more like it," said the officer. "You can't pull that John Smith stuff on me!"

The contractor felt bad and went to a doctor for the first time in his life. When he presented himself in his Adam's suit, the doctor let out a yell:

"Why, your navel is 10 centimeters lower than normal. Was it always that way?"

"No."

"Is it because of something connected with your work?"

"It's not from anything connected with my work. Perhaps it's because I've been flag bearer for my lodge for 12 years."

A group of tiny tots were overheard discussing their arrival in this big world. The versions differed somewhat. Billy claimed that his folks had bought him in a department store; Tommy said the stork brought him; Diane said the doctor brought her. Then a very tiny miss piped up, but rather modestly, "My folks were too poor to buy me; I was homemade."

The young man was praticing on his saxophone in the wee hours of the morning when the landlord came in.

"Do you know there's a little old lady sick upstairs?" asked the landlord.

"No," answered the musician, "hum a little of it."

EXCAVATING ENGINEER

A car screeched to a halt at an intersection, barely missing a white-haired old lady. But instead of giving the driver a tongue-lashing she recovered herself quickly, smiled sweetly and pointed to a pair of baby shoes dangling from his rear-view mirror.

"Young man," she asked, "why don't you put your shoes back on?"

The preacher concluded his week long revival meeting with a mass baptismal ceremony on a cold winter day. After one of the converts had been immersed, he was asked if the water was cold.

"No, not a bit," came the reply through chattering teeth.

"Better put him under again, parson," advised the local preacher. "He hasn't quit lying yet."

The child prodigy finished her piano selection and her doting father foolishly asked a bored visitor, "And what do you think of her execution?"

"When is it going to be?" was the eager reply.

First dog: "I feel so poorly lately—tired all the time."

Second dog: "Have you thought of going to a psychiatrist?"

First dog: "Heavens, no! I am not allowed on couches."

The lion was stalking through the jungle looking for trouble. He grabbed a passing tiger and asked, "Who is the king of the jungle?"

"You are, O mighty lion," answered the tiger.

The lion then grabbed a bear and asked, "Who is boss of the jungle?"

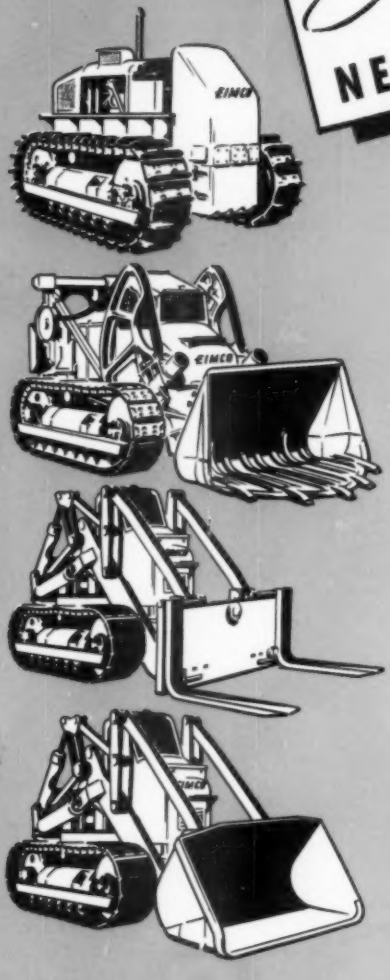
"You, O mighty lion," answered the bear.

Next the lion met an elephant and asked, "Who is boss of the jungle?" The elephant grabbed him with his trunk, whirled him around and threw him up against a tree, leaving him bleeding and broken. The lion got up feebly and said, "Just because you don't know the answer is no reason for you to get so rough."

The businessman was showing his daughter, who had just returned from finishing school, around the newly completed mansion. At the swimming pool they stopped in the bright morning sun to watch several athletic young men diving and stunting.

"Oh daddy," exclaimed the girl, "and you've stocked it just for me!"

THE BIG E Announces NEW MODEL DESIGNATION FOR SPECIALIZED CRAWLER EQUIPMENT



EIMCO 105

This is the basic **Tractor** available with **Dozer, Excavator** or **Excavator-Dozer** Attachments.

EIMCO 115

New number designation for Eimco's rugged **Steel Mill Excavator.** Extra-Strong, for use in slag pits and other steel mill areas.

EIMCO 125

This is model number for the **Front End Loader and Fork Lift . . .** fast, maneuverable, strong.

EIMCO 135

Specify this number for **Eimco's Steel Mill Front End Loader . . .** specially engineered and proven in use in steel mills throughout the world!

Every Eimco Crawler Unit gives you greater maneuverability, greater production and work-output, greater economy . . . engineered for service to your industry to save you time and maintenance costs.

Write for facts and qualified engineering assistance on Eimco . . . the MODERN Equipment.

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EXPORT OFFICE, 51-52 SOUTH STREET, NEW YORK, N. Y.

BRANCHES AND DEALERS IN PRINCIPAL CITIES THROUGHOUT THE WORLD

B-388

Best Way to Make Money on a Low Bid

4 YARD MARION 111-M

Better Compete WITH It Than Against It!

Small equipment can't match the efficiency of the 111-M on jobs that can use its capacity. Don't lose on the bigger jobs you want when you can move tons for pennies.

The ADVANTAGES of Size Without Disadvantages

Here's small-machine cycle time, maneuverability and portability in a big-yardage producer. Travels on two rail cars. Easy to prepare for shipment.

BIGGER, STRONGER and BETTER Than Ever!

Combine years of field-proved experience with important design and construction improvements—you get today's 111-M, a blend of the newest with time-proved features too good to change.

FEATURES THAT COUNT— Not Just Talking Points

Ward-Leonard electric swing on a diesel machine is a dramatic answer to one of the biggest problems for machines of this size. Add Marionair Control and optional torque converter and you have everything—all in the 111-M.

See your Marion Distributor now—ask for your copy of a new 24-page bulletin that gives complete specifications of the 111-M.

You Get **MORE** with **MARION**

MARION POWER SHOVEL CO., MARION, OHIO

A Division of Universal Marion Corporation

Diamond Drill . . .

Continued from page 33

stops automatically when there is too little water. As little as 1.1 gpm can remove cuttings from a 1¼-in. hole.

A vacuum carburetion system permits the Winkie to drill continuously at any angle without mechanical turret arrangement. An inexpensive tripod is available as optional equipment for use when coring at considerable depths. A hand winch may be installed on one leg. A patented Winkie "persuader" is optional for use in providing feeding leverage when drilling in hard formations or at above average depths. The "persuader" can be anchored with eye-bolt, soil anchor, truck plate or other handy support.

Winkie is powered by a two-cycle air-cooled gasoline engine. Maximum rotation speed of its diamond bit is 2,000 rpm.

Other Winkie features include a recoil starter and nylon cord to provide easy starts; an ignition switch to facilitate quick engine stops; a conveniently-located positive-action throttle; a large washable air filter; factory-set vacuum carburetion system; a "bulls-eye" level to help start vertical holes; a circular holding ring which protects the entire drill; self-adjusting mechanical seals in the built-in water swivel; and a water-cooled, oil-bathed and completely sealed gear box.

Optional Lengths

Standard core barrel lengths run to 18 inches; longer lengths are provided to customer specifications.

Applications for the Winkie drill include exploring mineral values; determining depths of overburden and mineral deposits; foundation testing and sounding; marine drilling; obtaining concrete cores; grout hole and blast hole drilling; and drilling conduit holes in masonry at any angle.

The Winkie can be set up in five minutes.

New Trade Literature

Subject: **A-C Tractor Accessories**
Content: A 12-page booklet catalogs special equipment for Allis-Chalmers crawler tractors and motor graders. Pictured and explained are such attachments and accessories as special truck shoes, pusher plates, floodlights, canopy top, cab heaters and hour meters. Ask for catalog MS-1189.
Where to get: Construction Machinery Div., Department EE, Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Subject: **Lightweight Diesel Engine**
Content: A newly-developed lightweight General Motors diesel engine for trucks, which is claimed to be 690 pounds lighter than its nearest competitor in the 210-hp range, is featured in a 4-page illustrated folder. Described are the design features of the new six cylinder 71-E engine which is trimmed to 8.4 pounds per horsepower through the liberal use of aluminum alloys in the cylinder block and other major components. The brochure includes also comparisons of performance and economy of the new GM model with competitive diesels of comparable horsepower based on factory ratings.
Where to get: Detroit Diesel distributors and dealers or Detroit Diesel Engine Div., Department EE, General Motors Corp., Detroit 28, Mich.

Subject: **Special Purpose Electrodes**
Content: A 20-page catalog and procedure guide lists Lincoln manual arc welding electrodes for hardsurfacing and for welding stainless steels, nonferrous metals and cast iron. The Weldirectory describes each electrode, its properties and applications and how to use it. Charts aid electrode selection and identification and give welding machine settings for each electrode. Ask for bulletin 7000.2.
Where to get: Lincoln Electric Co., Department EE, Cleveland 17, Ohio.

Subject: **Land Forming**
Content: Outlining what land forming is, the reasons for its importance, and the equipment to do the work is included in a new Cat booklet, *Tips For Land Forming Contractors*. The illustrated folder notes that land forming is a redistribution of soil to provide good field drainage and ease the jobs of irrigation and cultivation. Suggestions for engineering a land forming project are included in the booklet, with diagrams which show how a job could be laid out. The importance of various size and types of machines for different sized jobs is also included, along with requirements for land forming. Ask for form D858.
Where to get: Advertising Div., Department EE, Caterpillar Tractor Co., Peoria, Ill.

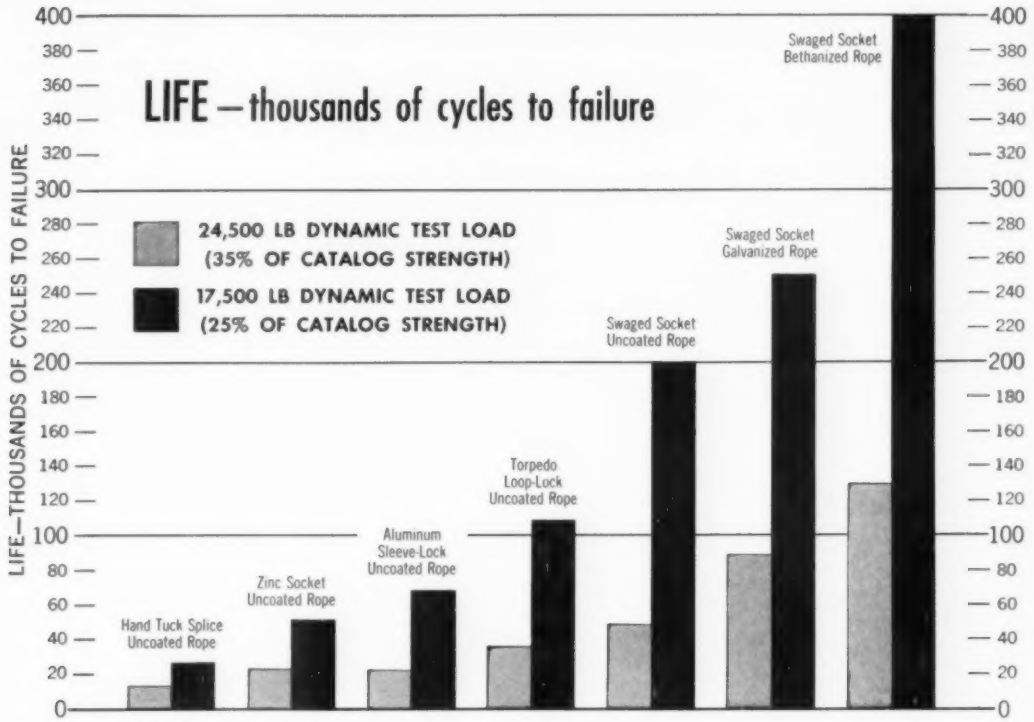
Subject: **Lightweight Pipe**
Content: As a help to pipe users, a new condensed catalog describes the complete Naylor line of pipe, fittings, flanges and connections. Data presented includes standard specifications for Lockseam Spiralweld pipe in sizes from 4 to 30 inches in diameter; illustrated data on one-piece Wedge-lock couplings and other types of connections; standard fittings for lightweight pipe; and welding flanges for Naylor pipe. Ask for bulletin No. 59.
Where to get: Naylor Pipe Co., Department EE, 1230 E. 92nd St., Chicago 19, Ill.

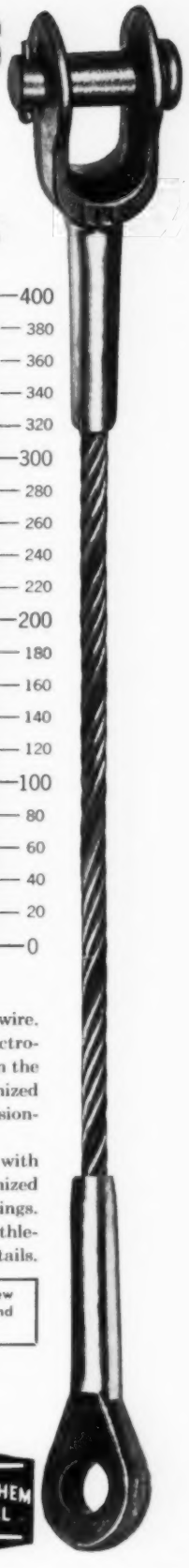
Subject: **Small Backhoe**
Content: A comprehensive booklet has been issued by Warner & Swasey on its snap-on-and-off Hopto backhoe. Illustrations show how the backhoe can be attached to either crawler or rubber-tire tractors. Views of the Hopto backhoe at work on a variety of jobs show its versatility.
Where to get: Badger Div., Department EE, Warner & Swasey Co., Winona, Minn.

Subject: **Slackline Cableways**
Content: Eight torque converter equipped slackline cableway installations are described in a Sauerman booklet. Haul distances of up to 1,000 feet and digging depths of 90 feet are covered in the individual plant stories. The brochure also gives typical operating costs for the cableway and contains a layout drawing of a representative installation. Ask for brochure TC-1.
Where to get: Sauerman Bros. Inc., Department EE, 622 S. 28th Ave., Bellwood, Ill.

TWO-YEAR STUDY REVEALS FACTS ON BOOM PENDANTS

Swaged socket proves best in exhaustive torture-tests





More than two years ago, Bethlehem began a research program to determine: (1) the type of end-fitting that would best prolong the life of pendants, and (2) the kind of wire rope that would stand up longest in this service.

Field research was carried on simultaneously with gruelling laboratory tests simulating field conditions. This research was wholly objective. Our purpose was to find *answers* . . . not to confirm preconceived notions.

The dynamic tests convinced us that the swaged socket is best by a wide margin. These tests were cruel, impartial. They showed that in dynamic holding-power, the swaged socket is unsurpassed. They also revealed a less obvious fact: that the swaged socket *distributes* the stresses occurring in the rope near the terminal fittings, instead of creating points of stress concentration. Result: longer pendant life.

The rope designated "Bethanized" in the above graphs was constructed of redrawn bethanized wire. The uniform, ductile zinc coating, applied electrolytically, acts as a cushion and lubricant between the wires in boom pendant service. Moreover, bethanized rope has the added advantage of high corrosion-resistance.

As shown by the graphs, bethanized rope with swaged sockets far outperformed hot-dip galvanized and bright ropes with various types of end-fittings. For further information, write or call us at Bethlehem, Pa. Our engineers will gladly give you details.

When replacing your present pendants or buying new equipment with pendants, specify bethanized rope and swaged sockets.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
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BETHLEHEM STEEL

BETHLEHEM STEEL

TO ADVERTISE: All advertising in this section is payable in advance. Rate: $1.00 per line, or $12.00 per inch of 12 lines. Minimum charge $4.00. No discounts; no commissions. Please count your copy carefully to avoid delay. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Be sure to enclose the correct amount of money with your order. Closing date—10th of preceding month. Example: January closes December 10th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

LARGE SHOVELS, CRANES, DRAGLINES — 3 YDS. & UP

HEAVY
EXCAVATION EQUIPMENT

Shovels—Cranes—Drills—Trucks

15-W Bucyrus-Erie Elec. Drag, 215', 13 yd.
9-W Bucyrus-Erie Diesel Drag, 165', 13 yd.
7400 Marion Diesel Drag, 175', 13 yd.
7400 Marion Elec. Drag, 175', 12 yd.
625 Page Diesel Drag, 150', 10 yd.
723 Page Diesel Drag, 130', 10 yd.
360-M Marion Elec. Drag, 175', 8 yd.
621-S Page Diesel Drag, 125', 7 yd.
200-W Bucyrus-Erie Diesel Drag, 125', 6 yd.
5-W Bucyrus-Erie Diesel Drag, 100', 6 yd.
2400 Lima Dragline, 130', 5 yd.
4500 Manitowoc Drag, 120', 5 yd.
120-B Bucyrus-Erie Elec. Drag, 115', 5 yd.
4900, 3500 and 3000 Manitowoc Cranes
111-M Marion Drag, 100', 4 yd.
1601 Lima 4 yd. Shovel/Drag
1055 P&H Drag, 80', 3½ yd.
1201 Lima Dragline, 85', 3 yd.
54-B Bucyrus-Erie Drag, 80', 2½ yd.
3560 Marion 26 yard Elec. Shovel
750-B Bucyrus-Erie 20 yd. Elec. Shovel
1050-B Bucyrus-Erie 20 yd. Elec. Shovel
5480 Marion 18 yd. Elec. H. L. Shovel
151-M Marion 7 yd. Elec. Shovel
170-B Bucyrus-Erie 6½ yd. Elec. Shovel
4161 Marion 6 yd. Elec. Shovel
120-B Bucyrus-Erie 4 yd. Elec. Shovel
111-M Marion 4 yd. Standard Shovel
54-B Bucyrus-Erie 2½ yd. Standard Shovel
Large selection of smaller Shovels and Drag lines available
Model T-750 Reich Truck Mounted Rotary and Down-the-Hole Drill
Euclid Trucks—Rear and Bottom Dump
Truck Cranes, Dozers, Scrapers, Front End Loaders, Drills, Buckets, Attachments and other miscellaneous equipment available.

FRANK SWABB EQUIPMENT CO., INC.
313 Hazleton Nat'l. Bank Bldg.
Hazleton, Pa. GLadstone 5-3658

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

Bucyrus-Erie, 71-B dragline (used 240 hours) 4½-cu. yd. new style bucket CB-E) Long wide crawlers, 42-in. treads, GMC Series 6-110 diesel engine, Clark Torcon torque converter, 70-ft. pendant suspended boom. Save. $15,000 or Rent.

CALL—WRITE—WIRE
J. P. WAITE, INC.
3304 W. Pierce St. Ev. 4-1900
Milwaukee 1, Wis.

Lorain L50 shovel. New in 1957. Actual hours 2200. Equipped with Cat D318 engine, 1-yd. manganese rock bucket. Machine is in excellent general condition. Price $27,000.

MIDLAND MACHINERY CO.
Chillicothe, Mo.
Phone Mission 6-2080
St. Joseph, Mo.
Phone ADams 3-2516

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

¾-yd. model 10-B Bucyrus-Erie shovel (1949), Hercules gas engine. Good working condition. Available immediately. $5,000 our yard, Milwaukee, Wis.

¾-yd. model H-3 Bucyrus-Erie Hydrocrane (1950) mounted on IHC A-162 truck chassis equipped with tagline reel, clam bucket. Very good buy.

¾-yd. model H-3 Bucyrus-Erie Hydrocrane (1952) mounted on Ford F-600 truck chassis, equipped with steel operator's cab, tagline reel, clamshell bucket. Very good condition.

10-ton model 11-B Bucyrus-Erie truck crane demonstrator and rental unit. 70' boom, jib, 6x6 carrier.

¾-yd. model 1020 Unit shovel equipped with GMC diesel engine. Good working condition. Priced to sell.

1-yd. model LS-90 Link-Belt shovel new 1953, Waukesha gas power. Excellent condition. To close out at $12,500, our yard.

1-yd. model 455 P & H crawler crane-clam-dragline with 75' boom, 15' jib, Chrysler 8-cyl. gas engine. Machine in excellent condition. F.O.B. Milwaukee.

1¼-yd model 33-B Bucyrus-Erie crane-clam-dragline machine, 70' boom, independent boom hoist, gas power. Very good condition. A lot of machinery for $15,000, our yard.

1½-yd model 604 Lima crane-dragline machine new 1951, Cummins diesel engine, 80' boom & fairlead. Was overhauled last winter. Very good condition.

2-yd. model 820 Lorain crane-clam-dragline machine, Cat D13000 diesel engine, swamp cats, 90-ft. flange type boom, fairlead, pressure lubrication system. In excellent condition. Rented, available in 30 days.

½-yd. model H-3 Bucyrus-Erie Hydrocrane (1953) mounted on 1953 Ford F-600 truck chassis, complete with 2-piece telescopic boom, tandem outriggers, operator's cab with heater, tagline reel, hydraulic clamshell bucket. Overhauled and repainted. In excellent condition.

½-yd. model H-5 Bucyrus-Erie Hydrocrane upper works, 9-ton capacity, equipped with two-piece telescopic boom, tandem outriggers. Ford Industrial engine, operator's cab with heater. In good condition. Mounted on your truck—$12,500.

¾ yd. model 375 American crawler shovel (new 1949) with Waukesha gas power. Priced at $8,750.

¾-yd. model 22-B Bucyrus-Erie crawler clam-dragline, equipped with Buda K-428 gas engine, 12'-3½" long crawlers, 70' boom, fairlead, tagline reel, in good condition. $12,500, our yard.

¾-yd. model 375 American crawler-mounted dragline, long crawlers, fairlead. Series 3-71 GMC diesel engine.

¾-yd. model "M" Insley dragshovel (new 1955), equipped with long wide crawlers, Cat D315 diesel engine. Good condition. $9,000, our yard.

J. P. WAITE COMPANY
P. O. Box 313 3304 W. Pierce St.
Milwaukee 1, Wis.

Northwest 25 Dragline w/45' boom and Cummins diesel engine. Serial #6488. $7,000 f.o.b. Greensboro, N. C.

Quickway Model "E" dragline machine with 35' boom, GM 2-71 diesel engine, and mounted on Army 6x6 truck. Serial #5768. $5,000 f.o.b. Greensboro, N. C.

Lorain TL-20 combination shovel dragline backhoe machine with Cat D311 diesel engine. Serial #18422. $10,500 f.o.b. Greensboro, N. C.

Shovel front for Northwest 25 w/trip. $1,200 f.o.b. Greensboro, N. C.

E. F. CRAVEN CO.
Greensboro, N. C.

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

1—1955 Bucyrus-Erie 22-B dragline with GMC diesel engine. An excellent opportunity to pick up a late model ¾-yd. machine reasonably priced.

1—Bucyrus-Erie 38-B. This unit is one year old. Combination dragline, clamshell, 60' boom, long-wide tracks, independent propel, diesel engine. Also 1¾-yd. Bucyrus-Erie dragline bucket.

4—AC HD-21's with Allis-Chalmers cable dozers and Gar Wood 281 rear double drum power control units, 26-in. track shoes, wrap-around radiator guards. All rebuilt in our shop, guaranteed for a period of 90 days.

2—HD-21's with AC hydraulic dozers. One is equipped with Tractomotive ripper. 26" track shoes on both units. Rebuilt and ready to go.

6—Allis-Chalmers HD-16's. All equipped with Allis-Chalmers Cable dozers and Gar Wood 281 rear power control units, 22" shoes and torque converters. Three rebuilt and guaranteed, three—"as is".

2—AC HD-16's with hydraulic dozers, 22" shoes and torque converters. Rebuilt and guaranteed.

5—AC TS-360's. These machines have been rebuilt in our shop and all the latest factory changes have been made. Guaranteed for 90 days.

2—Caterpillar DW 20's. Both in excellent condition, ready to go.

Complete concrete paving spread, including:
Rex dual drum paver
Blaw-Knox Spreader—20-25'
Blaw-Knox Subgrader—20-25'
Blaw-Knox Finishing Machine—20-25'
Blaw-Knox 10x10 Road Forms
1800 bbl. Cement Bin and 150-ton 3 compartment aggregate bin, fully automatic, with conveyors.

1—Euclid S-18 motor scraper. 18-yd. struck, 25-yd. heaped. Very good condition.

All of the above Equipment is less than two years old unless otherwise specified.

1—IHC TD-24 tractor with cable dozer and double drum power control unit. Machine is 18 months old. Priced right.

1—AC HD-11G 2¼-cu. yd. hydraulic loaders. Both have been rebuilt and are ready to go.

Blaw-Knox PF90 Asphalt Paver. This unit has been used very little. Here is a chance to save money on a paving machine.

Cleveland model 92 ditcher. Has 6" buckets, 10½" cut. Will dig 5' deep. Very good condition.

1—AC model Forty-five motor grader. Has cab, scarifier, large tires. Rubber very good, balance of machine in excellent condition.

1—AC Model AD4 motor grader. Has cab, scarifier, power steering, large tires. All tires either new, or recapped. A very good machine—priced right.

1—Bucyrus-Erie 22-B truck crane. 40' boom, good tires. Balance of machine in fair condition.

3—Ferguson disc harrows. Tandem units with 28" cutout type discs. Used less than 6 months.

3—Ferguson sheepsfoot rollers. 60" x 60" tandem. Used approximately 6 months.

1—AC TS-160 motor scraper. Has been demonstrated a total of 3 days. New machine guarantee.

1—Bucyrus-Erie 15-B hoe. Owner completed extensive repairs shortly before trading in. Very good condition.

1—Caterpillar D7 dozer with 7S cable dozer and No. 24 front power control unit. Condition fair.

1—Caterpillar No. 6 shovel. Rollers and idlers rebuilt, new sprocket. Good condition.

1—Buffalo-Springfield K-45 Kompactor. Used less than 6 months—a good savings on this item.

2—Euclid S-7 motor scrapers. One approximately 18 months old. Very good condition.

1—Ferguson 50-ton compactor. Unit has been modified so that it can be pulled by the tractor portion of a LeTourneau "C" Motor Scraper.

2—Euclid model 23TDT bottom dump wagons, 17—25½-cu. yd. capacity. Good condition.

D. D. KENNEDY, INC.
P. O. Box 177
Bellwood, Ill.

SMALL SHOVELS, CRANES, DRAGLINES — UP to 2½ YDS.

CRANES

Link-Belt Speeder Mod. LS85—¾-yd. capacity crane, 50' boom, 2 sheave boom point, 20" pads. Powered by Cat D318 diesel engine. As inspected. $5,500.

Link-Belt Speeder Mod. LS90, 1-yd. capacity crane, 50' boom, two sheave boom point, 24" pads, Cat D318 diesel engine. Reconditioned. $14,000.

LIMA Mod. 34 Paymaster, ¾-yd. crane, 35' boom, GM diesel engine. Reconditioned—30 day guarantee. $14,000.

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BUCYRUS-ERIE 38-B shovel, 20'-5" dipper stick, 1¾-cu. yd. dipper, powered by International diesel engine. Rebuilt. $38,500.

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BUCYRUS-ERIE tunnel shovel attachment for 22-B consisting of 14' boom, 12'-10" stick, 1-cu. yd. rock dipper, crowd drum, sprocket and crowd chain. Excellent condition. $3,500.

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LIMA 44T truck crane, 25-ton combination clamshell and lifting crane, 80' boom, 30' jib, Rudomatic tagline, Dart carrier, 9' wide, Waukesha engines. Very good condition. 30-day guarantee. $30,000.

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LETOURNEAU Mod. LS, 4-wheel scraper. (11-yd. cap.) Good condition. $4,500.

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CATERPILLAR D7, 22" tracks, crankcase guard, elec. starter, canopy top, w/Cat #46 hydr. control and Cat 7S bulldozer. Reconditioned—30-day Bonded Guarantee. $18,500.

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1 Koehring 303—¾-cu. yd. backhoe, 30" bucket, 10'-6" crawlers, 24" wide, Waukesha gas engine #484150, 4⅝" x 5¼", serial #2337.

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1 Bucyrus-Erie 15-B ½-yd. shovel attachment, perfect.

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